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ABSTRACT

This guide for using computers in the whole language classroom provides teachers with practical ideas for the use of computers to promote group interaction and cooperative learning, including: (1) software webs to assist theme development; (2) pre-computer activities to motivate students; (3) computer activities to develop software competence; (4) post-computer activities to reinforce learning; (5) matrices and checklists to use as evaluation tools; and (6) suggestions for initiating school projects and community events. Planned for teachers at the elementary level, grades one through eight, the guide is divided into 11 chapters: (1) Cooperative Learning with Computers; (2) Equipment and Materials; (3) Human Factors; (4) Using Software Across the Curriculum; (5) Using Theme-Related Software; (6) Integrating Computers with Whole Language; (7) Graphics/Text Software and Whole Language; (8) Word Processing Software and Whole Language; (9) Simulation Software and Whole Language; (10) Classroom Activities; and (11) Beyond the Classroom. A glossary, a list of software, a list of software publishers, and an index conclude the guide. (12 references) (DB)

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Learning Together

COMPUTER-INTEGRATED CLASSROOMS

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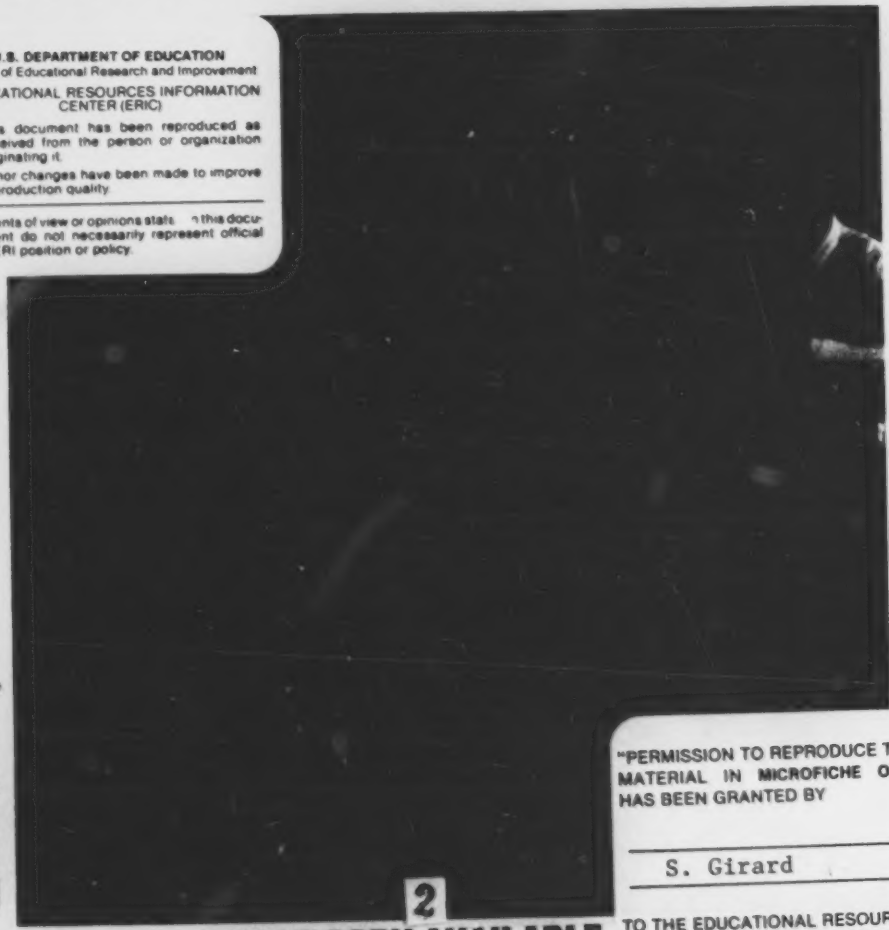

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COMPUTER-INTEGRATED CLASSROOMS

Pembroke Publishers Limited

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Preface

Many people have shared their expertise and enthusiasm with us during the years we have worked together with children, teachers, and computers. Instructors of the Federation of Women Teachers' Associations of Ontario (F.W.T.A.O.) and the University of Toronto, Faculty of Education elementary computer courses offered up-to-date theory and content along with support to explore the whole computer literacy area in creative ways.

Interactive Image Technologies in Toronto provided us with opportunities to evaluate software in the developmental stages and to communicate our findings at conferences and in journals. Through such field-testing observations, the positive impact of children working together in small groups came to light.

Teachers who have participated in our workshops and shared their ideas and concerns about using computers with their students have convinced us that they themselves have sufficient background and skills to integrate computers into their curriculum.

Hundreds of children have taught us about the ways they interact with computers. Some were involved in field-testing new software, others attended workshops, and many were in our classes at school. Children learn from one another and we learned from them.

The professional scope and freedom offered by the principal and administration at Montcrest School in Toronto, where many of our ideas and activities came to life, were indispensable in the development of such a hands-on text.

We acknowledge the invaluable insights of Lily Gibson, Jane Warwood-Nicholls, and Sue Taves. Their reading of the first draft of our manuscript gave us many practical suggestions. Another teacher, Don Collins, introduced us to the potential of using word-search and crossword puzzle software.

It is an honor to have had our work recognized by the F.W.T.A.O., which presented us with its 1989-1990 Writers' Award.

We hope educators will find this book a useful resource as they embark on their computer-integration journey.

Kathlene R. Willing
Suzanne Girard

Introduction

The longest journey begins with but one step.

Chinese proverb

In any teaching career, innovations appear from time to time. Whether the emphasis is on curriculum or on student involvement, your role has been to implement such trends in the classroom. An important innovation in education is the introduction of computers. While some computers may be located in classrooms, many are in labs, resource centres, or separate areas. Using the computer in educational ways may be, for you, a new and challenging role.

But before anyone can actually use computers in an educational way that is useful, it is important to assess the attitudes that accompany changes in technology. You may wonder whether your own personal teaching values have to be abandoned. Where, for example, do you fit in when the students are relating to machines? Another problem may relate to your level of knowledge and awareness: what are some of the basic computer terms and programs, and what are computers capable of doing? While striving to become better informed, you may find yourself in a difficult period of transition.

As many teachers have already discovered, computers and learning materials related to them can enhance classes in all subject areas and assist in the broad integration of methods and subject matter. Students can use computers for a variety of activities, such as drawing, writing, and analyzing, especially with the availability of software of many kinds: word processing, simulations, and databases, to name only a few. Also being experimented with in many schools is the computer link-up, within and between schools, which allows students to communicate and collaborate. In general, though, computers can become an everyday tool for practical use by you and your students, as has happened in schools all over the world.

Even if you have begun to gain a sense of the educational value of computers, it may still be difficult to start using them, especially in some subjects. Often, without realizing it, people erect

barriers when they are approached to try new ideas or materials, especially technological ones. It is more comfortable to continue with the familiar. Besides, several reasons for waiting to use computers are valid: the equipment keeps changing; it has to be learned like a new subject; and everyone is already busy with other matters, probably too busy to take on a new project. Some teachers who want to incorporate computers in their classrooms feel that an entirely new subject will emerge or that they must become experts overnight with the ability to present a perfect model of implementation immediately. All these concerns are valid, of course, but there is another side.

YOU ALREADY HAVE THE EXPERTISE

The technology of computers is intriguing and you may be curious about it. Watching others use computers successfully means that it has potential for strengthening programs and benefitting students. You truly would like to try computers: certainly the technology *is* new. But its place in the classroom may not be as novel as is often believed. Consider that over the years, like most teachers, you have developed many excellent techniques and strategies, such as establishing routines, giving and following directions, gathering appropriate resources, evaluating student progress, encouraging peer interaction, and drawing on student knowledge and experience. This expertise is exactly what is needed when computers are to be integrated into a classroom program. You do not have to develop a whole new set of experiences and skills; rather, you will rely on all aspects of your teaching background. Many ways exist in which you can transfer and adapt your knowledge and current teaching practices to computers.

In fact, what is being done in many schools and what teachers are doing everywhere is exactly that kind of adaptation! Working together and separately, teachers are benefitting from sharing a broad range of personal skills and processes. They have developed computer curricula, taught computer workshops for their colleagues, evaluated educational software, and attended conferences and workshops. By observing and exploring, teachers have become experts in the use of computers in the classroom.

Along with their students, they have learned by seeing how other teachers and students solve problems together. You may have used this same technique when adapting to other innovations.

All along, teachers have been learning together — from each other, from students, from colleagues. Many students became keen computer buffs and extended their activities in their own ways. Their excitement was contagious. Educators, too, teaching courses, leading workshops, and delivering speeches, have inspired many members of the teaching profession with their insights and enthusiasm. Approaching computers as another tool to help implement existing teaching values, they have developed computer-related materials and created themes featuring computer components. Out of these experiences have come student-produced books written and illustrated with the computer's help. Many students, with teacher encouragement, have dramatized scenarios and debated issues from simulations. In most school networks, experienced classroom teachers and consultants provide assistance. Find them and work with them because they are an integral part of the sharing process.

SCOPE OF BOOK

The scope of this book extends from aspects of education familiar to many teachers to novel ways of extending computer use. Cooperative learning is addressed, along with its implications for the computer as a powerful adjunct in group dynamics. In fact, the computer serves as a forum for students to work together and allows the teacher to observe student interaction in small-group activities. Also included are suggestions regarding equipment and materials, and considerations about the human factors that help to formulate initial thinking about computer integration.

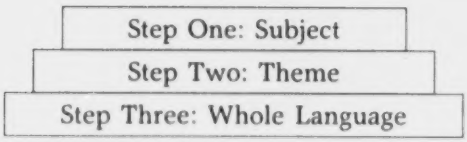
This book has been planned for teachers at the Elementary Level — Grades 1 through 8. Within the book, reference is made to Grades 1 through 3 as the Primary Level, Grades 4 through 6 as the Junior Level, and Grades 7 and 8 as the Intermediate Level.

The book presents several useful tools, including checklists, WEBS, and matrices, to provide extra assistance in planning, organizing, and evaluating. Also presented is a coding system that simplifies all references to subject areas and learning modes. For

teachers unfamiliar with some of the terms, a glossary is provided at the back of the book.

THREE-STEP INTEGRATION APPROACH

Expecially useful is this three-step integration approach:



In Step One, each subject is seen as an entity and appropriate software can be easily identified and used as is. In Step Two, a theme is established which can be augmented with suitable software. In Step Three, one piece of software is used to develop activities spanning many subject areas and learning modes grouped under one theme.

Computer-related activities can take place before, during, and after the software is used. Movement among the steps is also possible because you are not locked into one step at any particular time. For example, at one time you may be in Step One for most of the subject areas but in Step Two when a theme is being developed. It is quite common to be in one or more steps simultaneously, but a natural progression of a sequential kind is more probable. Different steps can also be seen as entry levels, depending on the purpose of the project and on your past experience using computers.

REACHING OUT

Additional ideas are provided for experiment in the classroom, each of them involving both teachers and students in special computer or computer-related projects. A glimmer of what lies ahead outside the classroom is also given. You might enjoy extending endeavors to other classes, the entire school, or even the community. For this reason, the chapter entitled "Beyond the Classroom" deals with school-wide computer clubs and fairs.

This is just the beginning, of course, because it is not possible to cover all there is to know in one book. For example, this book does not look at other generic software, such as databases and Logo. All the software mentioned is educational and most of it is dealt with in general terms. It is not the intent of this book to show how to use particular programs or computers from a technical viewpoint. Since software and hardware vary considerably, it is important to read the documentation specific to each program and computer used. That documentation, along with on-screen instructions, forms the front-line resources for using any software.

Computers by themselves will not create improved learning opportunities for students either as a class or individually. The way they are used makes the difference. This is your chance to embark on a "computer integration" journey. For everyone, the hardest step in a new direction is the first one. The ideas and suggestions in the book are intended to make that first step and subsequent ones interesting and easy.

1. Cooperative Learning with Computers

Computers are often perceived as solitary devices that isolate their users from other people and from social activities. This is a misconception. Computers can bring people together who might otherwise never have an opportunity to meet. They can enable people to work together in ways that were never thought possible.

Frank Smith, Insult to Intelligence

Whole-language classrooms are exciting when students work in small groups. Teachers have long been aware that small-group work provides students with opportunities to use both modes of learning — receptive and expressive. Speaking and listening can be used along with representing, writing, reading, viewing, and thinking. How is it possible for computers to enhance this process?

When students gather around computers, they exchange and discuss ideas in meaningful ways. Not only do computers provide students with a natural place for learning from one another, but the software supplies a purpose for learning. Regardless of how students are grouped — by number, ability, background, or gender — they share a common goal. The software requires them to make decisions, and in many cases, to read. Interestingly enough, they can be observed reading, yet they do not realize they are reading. In fact, students often state that they enjoy the programs because they do not have to read! Their interactions are dynamic: as they read and discuss, they bring their thinking skills into action. They compare and contrast ideas, refer to the text, hypothesize and predict outcomes, reflect on, and draw upon their own experiences, generalize and formulate conclusions, analyze, put new information into context, and make judgments. Furthermore, they keep on task!

When students and teachers work together with computers, the dynamic interactions of the groups — compared with the static behavior of students using software individually — always produce valuable insights. The teaching/learning potential becomes

apparent: students are not only seen and heard using metacognitive strategies as they grapple with their decisions, but their helping and supportive behaviors are also on view. Their conversations and actions reveal that members of the more successful groups use and share a variety of communication roles that encourage cooperative learning.

What makes cooperation possible? Sharing a goal and respecting each other. Because cooperative learning is task-oriented, equal participation and commitment are necessary. Group members must share a respect for each other as well as for their goal. If one of the members is achieving a goal, the others are probably achieving theirs, too. Communication plays an important part in cooperative learning; if cooperation exists, it tends to be frequent, open, articulate, effective, and task-related.

Just getting students together in groups, however, does not ensure success. Studies in group behavior point out that the quality of interaction in small groups has an important influence on learning. In cooperative settings, high quality interactions are more possible, but most teachers know this from personal involvement. When students work cooperatively, learning improves, but what is less obvious is why some groups are better at cooperating than others. The key is communication skills.

At the outset, all students are not equally able to use communication skills effectively. However, as teachers are aware, students can learn to become more cooperative, because the skills can be taught and evaluated. When students are expected to work satisfactorily in groups, they must be given the necessary tools to help them become better communicators. A two-stage method works well here. The first stage is the teaching and modeling of appropriate communication skills, usually introduced as part of regular classroom activities. In the second stage, students are given opportunities to practise group communication skills and are provided with interesting materials to discuss. In this stage, computers provide a natural forum for students to gather for a purpose. In such an environment, computers become vehicles for whole-language learning.

It is common to hear of teachers who have tried small-group work, found it sadly disappointing, and wondered what went wrong. Usually, initial guidelines help students to cooperate and

encourage them to see the value of what is being done in the group. The skills students learn from regular classroom activities can be applied to group work with the computer.

To foster group cooperation:

- model and teach appropriate communication habits, such as listening, politeness, speaking up, and not dominating the conversation
- structure a supportive environment in which each student has a chance to observe, demonstrate, and evaluate group behavior models
- provide meaningful materials that will create interest because they are probing or controversial

Communication Skills

What skills facilitate cooperative learning? Adults readily assume cooperative communication roles by asking questions, stroking people's egos, focusing on problems, and keeping discussions on track. Some even play the devil's advocate for the sake of a good argument. If they are working in a successful group, chances are other members of the group will be doing likewise.

Labeling these communication roles — *facilitator, clarifier, questioner, skeptic,* and *reinforcer* — makes them easier to understand. By analyzing the kinds of statements or phrases which identify each one, you can encourage your students to do the same. Although the roles are not always mutually exclusive, presenting them separately is helpful. The following statements and questions typify the roles and encourage active participation by all members of the group.

Facilitators make things go smoothly and help the group accomplish its goal. If the goal is shared and valued by all the group members, they will want to stay on task.

Facilitative statements and questions:

- "What do you think, *name*?" (This brings someone into the discussion who may not have been heard from for a while.)
- "You read this and I'll do that." (This organizational strategy brings someone into the process and manages time efficiently.)
- "If we each read two sentences, we can . . . . " (This organizational strategy focuses on or manages the memorization of information in a given time.)

Questioners bring problems into focus, thus providing the first step to understanding. Their questions serve as catalysts for clarification. Although their position may be unpopular, it may pave the way for others who are afraid to speak up. The questioner's role should be valued as a method of encouraging deeper thinking. Questioning statements can provide excellent opportunities for helping behavior.

Questioning statements and questions:

- "I don't understand. . . ."
- "It doesn't make sense that. . . ."
- "What does *word* mean?"
- "How does this fit in?"
- "If that's the case, then how come. . . ?"

Clarifiers give explanations. Prompted by member needs through questions that are raised, clarifiers take advantage of opportunities to help others understand. This role gives all members a chance to solidify their thinking. Clarification should be seen as more than just the "right answer." It should be seen as "This is the answer because. . ." Answers should lead to further explanations which improve understanding.

Clarifying statement in answer to the question "What does 'hoof it' mean?":

- "'Hoof it' means to walk. You know, like a horse, horses' hooves!"

Skeptics provoke discussion to go further. They are the doubters who ask the pointed questions and demand support for the answers, refusing to take an answer at face value. Their skepticism increases the chances for members to think more deeply and supply reasons.

Skeptical statements and questions:

- "What makes you so sure that will happen?"
- "If we choose that, it won't work because. . . ."
- "That won't change anything. It will just. . . ."
- "Suppose that does happen? Then what?"

Reinforcers make positive contributions, from thanking someone to noticing when someone has done something well. Their positive comments focus on ideas, not personality.

Reinforcing statements:

- "Thanks. That helped."
- "Your explanation made it clearer to me."
- "I liked your ideas about. . . ."
- "Let's use *name's* way. It sounds like it will work."

These five roles can be practised in the classroom. Students' thinking about the roles can be activated by brainstorming statements or questions they could make to typify the roles. Students

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could work in small groups to compile a list to share with the whole class. New statements or questions would then be added to charts already posted around the room to serve as reminders. Communication skills can be integrated with other classroom activities, too.

Supportive Environment

Learners benefit from seeing and hearing cooperative communication skills in action. That is why modeling is important. Many of the illustrative statements and questions provided can be used with students. For cooperative learning to take place, a supportive classroom environment must be established early in the school year. Most students find it easier to familiarize themselves with new ideas and expectations when the school year begins. But that should not deter you from starting in midyear. The most important factor is that you be comfortable with the approach, especially if it is new.

To help students understand the underlying helping behavior inherent in cooperative learning, encourage them to focus on personal feelings. Activities may be structured so that students can use their own experiences. Later on, when talking about their communication roles, they will be better able to come up with realistic statements and questions. Several stages are involved in this process.

First, the students must become aware of their own feelings — how they react when both good and bad things happen to them. They can share their feelings with the class in various ways, such as drawing faces to show emotions or writing about personal experiences. They can also respond to open-ended statements, such as:

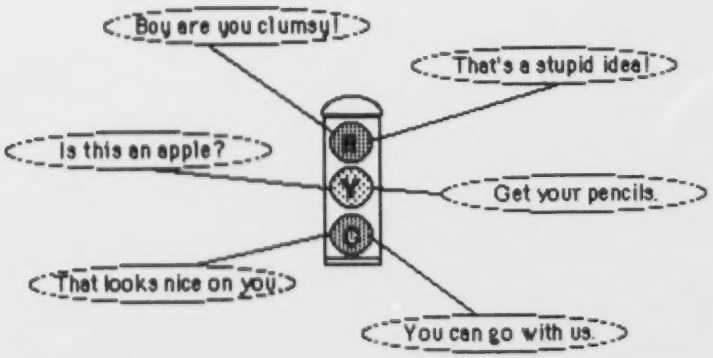
- "When someone hits me, I. . . ."
- "When I do well in school, I. . . ."
- "When I'm accused of something I didn't do, I. . . ."
- "When I get mad, I. . . ."
- "When I am happy, I. . . ."

Once they have focused on how they feel or act when things happen to them, they can more readily appreciate how others

feel. The following terminology that uses a familiar concept — traffic lights — is useful for this purpose and can be used in activities that reinforce the ideas:

- Redlight statements *stop* us. They make us feel bad about ourselves.
- Greenlight statements give us *go*. They make us feel good about ourselves.
- Yellowlight statements are *neutral*. They do not affect us one way or the other.

Younger students enjoy playing games like "Simon Says." They advance one giant step for a greenlight statement, take one giant step backwards for a redlight statement, or remain in the same spot for a yellowlight statement. Students could be encouraged to discuss the three kinds of statements and their feelings. At the same time, you could WEB their statements in redlight, greenlight, and yellowlight categories. Some students may wish to role play situations in pairs or small groups, while others may prefer to list the statements for one category. The class can then discuss the lists which have been rewritten on flip charts for easy visual reference.



Often, students may not be aware that choices are available or, if they are, they think in extremes. In the case of conflicts, discussing different ways of resolving issues helps students become aware of their power to make choices and successfully act upon them. To activate students' prior knowledge about conflict resolution, a problematic situation could be described. Then, as students explore different responses, their ideas can be recorded on a WEB.

Here are some possible problem-solving scenarios:

- Your younger brother/sister has taken one of your favorite tapes without your permission and is playing it. The last time he/she played one of your tapes it got tangled and ruined. What can you do?
- One of your classmates is using the computer to write a story. You have an assignment due before lunch. Your classmate, who has been assigned computer time, won't let you use the computer. What can you do?
- You and three friends are planning a party. You want it to be a costume party with music. Two others want it to be an outdoor party with games and races. The fourth person is undecided. What can you do?

Students' awareness of conflict resolution can be heightened. Their prior knowledge can be activated by writing DISAGREEMENTS on the board or on a chart. Then students could list all the ways they might resolve disagreements. They may come up with suggestions similar to those listed below, which could be used to design some creative posters:

- **Share** whatever it is and both do it together.
- **Ask for outside help** from a classmate or a teacher who is not involved.
- **Compromise** and work out an arrangement using each person's ideas.
- **Take a chance** by flipping a coin.
- **Postpone** the argument until those involved have cooled down.
- **Avoid** the disagreement by acknowledging they do not agree and get on with something else.

- **Take turns.** One can do it now and the other later.
- **Use humor** by making a joke of the situation to release tension so that problem-solving can occur.

Role-playing is another way for students to experiment with new ways of resolving conflicts. They could role play situations similar to these:

- An older student has just cut in front of you in line.
- A classmate has taken your pencil crayons without asking permission.
- Your two best friends have ignored you during recess.

The Computer: A Natural Forum

The computer is a place to bring people together, a natural forum for students to gather. The software provides their purpose for gathering. As they practise communication skills, they learn cooperatively.

The kind of software available is critical to the kind of atmosphere generated in the classroom. High quality software, examples of which are discussed in chapters 4, 5, 7, 8, and 9, entices students to return to it again and again and has the following features:

- focuses on decision-making and problem-solving to lead students into different ways of thinking
- is open-ended so that students can experiment with many alternatives
- has built-in flexibility so that different students can use it for a variety of purposes and topics
- permits interaction for small groups to discuss and share a common goal.

How should students be grouped? As with other classroom activities, the teacher is the best judge. When grouping students, you probably consider the following factors and ask these questions about your students:

- personalities: "How do they work together?"
- abilities: "At what level are they?"
- interests: "What do they share in common?"

At the same time, the purpose of the group can help determine its composition. Common reasons for working in a particular group may include:

- researching specific topics
- peer-tutoring
- pursuing common activities
- enjoying working together.

Participating in small groups is a broadening experience which exposes students to different kinds of people. Since students benefit from developing cooperative group skills with classmates who differ in sex, personality, ability, ethnic background, and interest, the groups should be changed regularly to provide the greatest possible diversity and challenge.

Assessment of student progress is a demanding and challenging task. When this is compounded by the integration of computers in a whole-language program, you may feel confronted by an impossible situation. This need not be the case if careful attention is given to the kind of evaluation a whole-language program requires.

Obviously, the focus must be on formative evaluation, the ongoing assessment of student progress aimed at assisting students in their learning and at improving their educational experiences. Assessment of such key matters as feelings, conflict resolution, and communication skills (oral and written) is best achieved by observing and listening to students. What they say and do and how they relate to their peers become important. Both teachers and students, then, may need to hone their skills of observation and listening.

Cooperative learning checklists, such as those provided on pages 24-26, will simplify the task. These can be developed for both teachers and students. The criteria can be predetermined by you, or they can evolve through class discussions and brainstorming. Some checklists may even include both teacher-chosen and student-chosen criteria.

To determine how well students are developing communication skills, you can play the role of "roving reporter," moving from group to group, listening to what students are saying to one another and observing their behavior. Comments or questions that typify specific communication roles (facilitator, clarifier,

questioner, etc.) would be recorded for later discussion with the group concerned or with the entire class. To keep this stage of "reporting" non-threatening, names and groups would not be mentioned. The focus should be on what was said and how it worked. Students should be encouraged to think about how the discussion was advanced or organized, how positive feedback made the speaker react and brought out an improved idea, and how the "doubting Thomas" in the group provoked them to think further, perhaps improving the outcome.

When leading classroom or large-group discussions, you will find word WEBBING helpful. Webbing is a process in which brainstorming ideas can be organized visually to help students broaden their perspectives on the ideas and topics under discussion. It also helps them to link new information and concepts to what is already known, summarize, compare, contrast, and consolidate information. Depending on the particular goal and the level of the students, you can do the webbing on chart paper or on the board, making the links and connections as the discussion unfolds. After this, students can do the webbing in small groups or pairs. For a more thoughtful and analytical approach, students can use tape recordings to evaluate their sessions.

Evaluation may be accomplished in different ways. One method is that of the roving reporter listening to and observing specific behavior. For the broader picture, you could use a cooperative learning checklist similar to the Teacher Checklist on page 24, which includes concerns about how students use the material, pace and control themselves, and work as a group. This checklist can be expanded or altered to suit your needs or it can be changed so that students can assess their own performance.

The Student Checklist on page 25 is based on communication roles and can be modified so that students can monitor their own personal behavior in the group or the group's behavior. Working in small groups to discuss what communication skills are important for them to evaluate, they can design their own checklists, perhaps with the assistance of word processing software.

A Teacher / Student Checklist, similar to the one on page 26, may be designed to record student progress. For each student, an initial checklist may be completed at the beginning of the school year for a baseline and subsequent ones on a regular basis thereafter. This checklist records students' independent learning skills on a scale of 1 to 10 where 1 is low and 10 is high.

Cooperative Learning
Teacher Checklist

Use of Material	Yes	No
Students use the material relevant to their discussion.	____	____
Questions/comments provoke deeper thinking.	____	____
Pacing		
Students keep the discussion going.	____	____
They use a variety of questions.	____	____
Interaction exists among all students.	____	____
Control		
Students continue involvement.	____	____
They stay on-task.	____	____
Their questions tap critical thinking.	____	____
Sense of Audience		
Students are sensitive to one another.	____	____
They handle disagreements positively.	____	____
They use conflict resolution.	____	____

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Cooperative Learning
Student Checklist

		Yes	No
Did I/We:	• offer an idea without being asked?	____	____
	• support my/our ideas with words from text?	____	____
	• mention a new idea?	____	____
	• give useful information?	____	____
	• ask useful questions?	____	____
	• do all the talking?	____	____
	• make someone else think?	____	____
	• reject my/our own idea?	____	____
	• reject someone else's idea?	____	____
	• say something positive?	____	____

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Cooperative Learning
Teacher/Student Checklist

Student:

• takes active role in learning process.	1	5	10
• is self-directed.	1	5	10
• takes responsibility for learning goals.	1	5	10
• co-operates with a variety of people.	1	5	10
• helps others when needed.	1	5	10
• asks for help when needed.	1	5	10
• collaborates effectively with others.	1	5	10
• uses a wide range of thinking skills.	1	5	10
• uses a variety of resources (print and non-print).	1	5	10
• applies learned content to independent tasks.	1	5	10
• reflects on and benefits from self-assessment.	1	5	10
• reflects on and benefits from peer-assessment.	1	5	10

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2. Equipment and Materials

You may be ready to begin integrating computers into your classroom right away, although it may seem like a complicated endeavor. Some classroom innovations require a whole new set of experiences and skills, but, fortunately, computer integration is not one of them. Just as students proceed from the "known" to the "unknown," you can start by drawing on your teaching background.

Without realizing it, most teachers already know many of the necessary practicalities. Distinct parallels exist between non-computer school equipment, educational materials, and learning centres, on the one hand, and their computer counterparts, on the other. This chapter focuses on hardware, software, and computer centres.

Hardware

Non-computer Equipment	Computer Hardware
• typewriters • television monitors • video cassette recorders • tape recorders • cameras • calculators • film projectors • overhead projectors • filmstrip projectors	• monitors • keyboards • printers • disk drives • modems • mouse • joysticks

You normally come in contact with equipment in many areas of teaching: projectors, videos, tape recorders, cameras, calculators, and typewriters, to name a few. You have learned how to treat them – to store them properly and use them in appropriate locations and to keep the working parts clean and in good order. And although taking them apart and reassembling them may not have been your responsibility, you no doubt acquired a sense of how the parts were interrelated.

Computer equipment can be viewed in the same light. Computer hardware includes monitors, keyboards, and peripherals,

such as printers and disk drives. Rely on the expertise you gained using other equipment and transfer it to this technology. Computer hardware also must be stored and used in appropriate locations — away from direct heat sources, sand and water tables, and chalkboards. Computers can be kept clean by vacuuming and using dust covers. Since computers operate as a system, their parts need to be compatible and connected in specific ways.

Hardware considerations:

- Provide sound insulation, such as a room divider, near the printer.
- Ensure cords are attached to the equipment and outlets in such a way that they will not become dislodged easily or accidentally.
- Place the equipment on a cart so that it can be moved easily from one location to another.

Software

Non-computer Materials	Computer Software
• books • magazines • pictures • films • filmstrips • audio cassettes • video cassettes	• disks • manuals • documentation

You are used to scanning a wide variety of educational materials to determine their relevance. If they are interesting, you take a closer look before incorporating them into your curriculum. This ongoing previewing process with books, films, cassettes, pictures, and magazines helps to relate appropriate content to particular subjects. Readability and age appropriateness are important considerations. Even aesthetics have subtle but crucial influences on the selection of learning materials.

Computer software packages include programmed disks along

with documentation. The documentation for educational software often contains a user's guide, blackline masters, teaching suggestions, and perhaps posters and stickers. These are, in fact, print and visual materials. Some of the software materials are presented on screen just like videos, films, and filmstrips. Again, you scan the printed materials to find out whether or not they are relevant, bearing in mind that some software may cross subject area boundaries. Previewing the program helps determine how appropriate it is to your students' reading skills and maturity levels. Choices may be influenced by appealing yet purposeful screen designs where graphics enhance the content. Open-ended software that encourages social interaction, discussion, questioning, and cooperative learning should be given a high priority. For other ideas on the kind of software to choose, consult the guideline, Software Evaluation Criteria, at the end of this chapter. Software is your springboard to creative, meaningful integration.

Technical tips:

- Post the steps for correct loading and saving of software near the computer for easy reference.
- Regulate the sound component of the software when necessary, using the instructions in the user's guide.
- Store disks in their envelopes away from dust, severe heat and cold, magnets, televisions, and disk drives.

Centres

Non-computer Centres	Computer Centres
• learning centres (reading, listening, drama, research, math) • equipment (tape recorders, puppets, blocks, typewriters, calculators) • materials (books, magazines, tapes, filmstrips, activity cards)	• learning centre (computer) • equipment (monitor, keyboard, disk drive, printer, mouse, koala pad) • materials (books, magazines, activity cards, software, documentation)

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Learning centres can provide a varied and flexible learning environment. Parts of your classroom — a cosy corner, a large table, a window sill, or an area rug — may be devoted to a subject area, theme, or unit. Depending on the type of activities, decisions are made as to the location of appropriate equipment and materials. Centres can be made visually appealing with displays of posters, pictures, and students' work. Once they are set up, these centres change as students use and add materials. Even the centres' directions evolve over time.

You can set up and operate computer centres in much the same way. Classroom supplies already on hand can simply be put to new use. A table against the wall in a well-lit part of the room with two or three chairs can be a start. The work space needs to be as large as possible to accommodate the computer monitor, screen, disk drive, and printer. Since these pieces of equipment have to operate at the same time, they could be plugged into a power bar. Just as in other learning centres, materials need to be within easy reach. Computer books and magazines can be stored on shelves and software kept in cardboard or plastic boxes. Pencils and markers can be put in tins or baskets. Once the computer centre is established, different activites are possible. A bulletin board can also be an integral part of your computer centre. Students enjoy seeing their computer printouts displayed along with items such as photographs of their groups working at the computer, or their own artwork.

Computer centre tips:

- Post timetables and rules in clear view.
- Feature student-produced materials, such as computer scrapbooks, newspapers, and books.
- Provide such items as counters, calculators, and robotic toys.

Software Evaluation Criteria

The software:

- provides exciting, stimulating focus for *MEANINGFUL* thought and discussion
- displays attractive graphics and clear, well-spaced text, all of which maintain the program's momentum
- incorporates clearly defined, task-related interaction
- provides risk-free environments in which students may hypothesize, experiment, and make mistakes
- encourages creative as well as logical thinking
- treats students as intelligent human beings by addressing them at their level
- invites repeated involvement by being open-ended and accessible at various levels
- presents a variety of activities/tasks which may require problem-solving
- creates a forum for small-group interaction
- promotes successful and enjoyable learning experiences.

3. Human Factors

Learning is a lifelong process.
K.R.W.

Essential to any successful computer-oriented program are the human factors: students' individual needs, equity issues, and classroom management. Considering your students' skills and interests, providing equal opportunities for both girls and boys, and structuring computer time all play an important role in the whole process.

Individual Differences

You already accommodate students with a wide variety of learning styles, abilities, and needs. Challenging all students so that they can be successful demands special sensitivity and expertise. An integrated whole-language approach contributes to a secure and stimulating environment because it allows you to respond to students' individual differences. Challenging, multi-levelled activities encourage students to become self-motivated, self-directed problem-solvers who enjoy learning.

Computers, used in integrated settings, fulfill educational goals by:

- fostering positive attitudes towards self and learning
- accommodating differing learning styles, abilities, and needs
- individualizing student instruction and evaluation.

Computers, used in integrated settings, help students develop skills in areas such as:

- investigation and experimentation
- observation and recording
- responding and communicating
- critical thinking and evaluation.

Individual differences in these skills areas are just as apparent when students use computers as when they are doing other classwork. By observing students as they use the computer and being sensitive to their learning styles and abilities, you learn how to facilitate their learning. When trying out a new program or mastering a familiar one, some students will be more curious and innovative than others. They may discover key functions, program features, and use documentation more independently than others. For those who take fewer risks, you may wish to provide additional modeling and suggestions. Screen presentations often hold the attention of students who are easily distracted. Entering stories with a keyboard can ease the writing process for students experiencing difficulty printing or writing. Some students will be more comfortable, at first, dictating a story for another to enter. Those who have difficulty reading print materials may respond well to reading text presented on a computer screen. Others benefit from their incidental reading of screen text, which may even be at a higher level than usual. Certain students may excel at troubleshooting when problems arise, while patient and supportive students may help others to understand the computer and the software they are using.

Equity Issues

> *. . . the more you can integrate it [computer] into your curriculum, the faster you will close the computer gender gap.*
>
> *Jo Schuchat Sanders and Antonia Stone,* The Neuter Computer

The very fact that students are learning in an integrated environment is conducive to dealing with equity issues in a positive way. Both girls and boys must have equal opportunity for social and academic growth. However, in the field of computer education, problems concerning bias, roles, and access still exist. Understanding these problems may lead teachers to alternatives that will help to achieve the goal of equal opportunity in computer education. The issues of bias, roles, and access deserve special attention.

Bias Problem	Alternative
• stereotypes • unnecessary requirements	• raise consciousness • realistic requirements

Since sex-role stereotypes are rooted in biases about the aptitudes and abilities of women, they can severely limit computer opportunities for girls. Raising the consciousness of students is an alternative. A critical awareness of the portrayal of the sexes in the media and the kind of language used in your classroom will help dispel stereotyping. Biases also contribute to unnecessary prerequisites for computer use. Girls are at a disadvantage on two counts. General attitudes about technology and girls often discourage them from exploring computers. As well, society links mathematics to computers. When mathematics is viewed as masculine, girls are not only excluded from mathematics but from computers, too. The study of technology and mathematics should neither preclude girls nor be a necessary prerequisite for learning about computers. This knowledge and awareness enables you to screen educational materials, including software, for inequities.

Role Problem	Alternative
• lack of adult models • lack of peer models	• involve female adults • encourage female participation

The problem of appropriate models is rooted in sex-role stereotypes. Students need to see women in a variety of roles; including computer-related occupations. This alternative could be accomplished, in part, by inviting business or professional women to share their computer expertise with the class. Although providing adult female role models is part of the solution, students' peers are even more important, because students are strongly influenced by them. They like to do the same things as their friends. When girls see other girls, whom they admire, using computers, they are impressed. A simple way to address this situation is to include girls when moving computer equipment, taking

it apart, and reassembling it. Allow girls to do the problem-solving needed for troubleshooting. Girls should also be included as computer experts at events such as parents' nights, education weeks, curriculum nights, computer competitions, fairs, and clubs. Actively encouraging girls in computer roles and providing female role models are positive steps in establishing sex equity in your classroom.

Access Problem	Alternative
• lack of opportunities • environment not conducive	• increase opportunities • change environment

Even when bias and sex-role stereotyping have been overcome, the quantity and quality of computer access can be a problem for girls. Discrepancies in computer opportunities do actually exist between girls and boys. Boys more often have computers at home and engage in computer-style recreational pursuits. The competence and confidence they gain outside school gives them an edge over girls in using computers. For this reason it is important to increase girls' opportunities by providing more time slots, scheduling equal girl-boy ratios, and selecting boy-girl pairs. Along with increasing computer opportunities for girls, you will need to address the quality of those times. Structuring girls' computer environments can make them more conducive to learning and benefit boys just as much. Since many girls respond positively to purposeful tasks and working with a friend, you will want to give priority to software that promotes social interaction. When computers become an ordinary part of students' everyday life, problems of bias, sex roles, and computer access are reduced significantly.

Time Management

Time management, which includes organizing and scheduling computer use, applies to the classroom computer centre as well as to computer labs. Although the approach of this book is based

on the presence of at least one computer in the classroom, so that it becomes an integral part of the learning environment, the suggested teaching strategies are adaptable to computer labs. The main modification will, no doubt, be in scheduling. To ensure equity, it is vital that scheduling be based on tasks expected of all students.

Computer use can be organized to implement different kinds of learning activities. A variety of ways are available. Individual students may benefit from using software especially suited to their needs. Pairs of students may enjoy collaborating on a piece of work. A small group may be taught how to use a particular piece of software and then be available as helpers. While most of the class is working on other tasks, a special interest group may pursue its own project at the computer.

Computers can be the focus for whole-class or small-group instruction. If available, a large monitor can be attached to the computer for easy class viewing. Language experience stories may then be composed at the computer or a new piece of software or theme may be introduced to the whole class. Students enjoy contributing to group efforts by entering information and answers.

Although time and computer access are often limited, you can maximize resources in several ways. Consider asking parent volunteers to work with individuals or small groups at the computer. Previewing software with parents helps to increase their computer involvement as well as their confidence. Guidelines governing the use of the computer contribute to the overall efficiency and productivity of the students, who can then be encouraged to draw up their own rules. In doing so, they are more likely to follow them.

Scheduling computer time depends on your student-to-computer ratio. Students can be scheduled individually, in pairs, in small groups, or as a whole class. Sign-up sheets are useful and may cover a daily, weekly, or perhaps monthly period. If a computer lab is available, blocks of time may be booked for special projects and students scheduled accordingly — with due regard, of course, for other teachers and their students. Groups may be rotated through learning centres, one of which has a computer. Or, groups may work at the centre of their choice. Students can be encouraged to take responsibility for their computer use, sharing the role of schedule monitor and reminding one

another about their turns. Sign-up sheets ensure equal time at the computer when guidelines are followed. However, some informal monitoring on your part may be necessary.

Scheduling hints:

- Pair students with computer buddies to enable them to catch up on classwork they missed while using the computer.
- Coordinate students' subject strengths with their computer time to ensure that any work missed can be completed independently.
- Reassign the computer times of absent students to other students who are willing to trade.

Another organizational strategy is to bring students into the decision-making process of who will use the computer for a particular period. The discussion would be based on needs, such as who has a project to be completed and what needs to be done for the day.

4. Step One — Using Software Across the Curriculum

Starting on the computer integration trail can be both challenging and daunting. In general, working with computers involves a great deal of following directions, sequencing, and creative thinking. Since most teachers are already using these skills in their everyday teaching, they come to computer integration from a strong position. Curiosity also plays a role. They bring their inquisitiveness to the task, as well.

This chapter covers the first step of a three-step approach to the computer-integrated classroom. Step One deals with introducing a computer component into whole-language teaching. Working within the standard parameters of a class and the content area, the chapter shows how individual pieces of software can be used. This comfortable and useful step adds a new dimension to computer awareness and expands computer experience for both you and your students.

The next chapter covers Step Two, which is a vehicle for more extensive integration. Once again, you are shown how to work within an established classroom structure of themes, while continuing to implement personal approaches to content and presentation. Also suggested are ways for finding appropriate software to help with this process.

Webbing plays an important part in the planning process. As an example of software planning, the WEB in this chapter shows various software categorized by subject area. In chapter 5 two webs are shown. The first example illustrates theme building in general without computer integration. Its theme is *pond* life (page 48). The second web deals with the matching of software to subjects, as is done in Step One. However, this second web illustrates Step Two because it combines the concepts of Step One with the use of a theme. Theme-related and computer-integrated, it explores the theme of *bears* in six subject areas (page 50).

Keep in mind that incidental learning is taking place as movement occurs through the three steps. For this reason, do not rush from one step to the other. Take as much time as you need in order to feel comfortable. The steps may even be combined. For

example, a piece of mathematics software may be used to reinforce a certain skill, as in Step One. At the same time, theme-related software may be introduced in a variety of other subjects, as in Step Two. Themes continue to play a role within a whole-language framework, as in Step Three. By setting the pace, you can integrate computers with confidence.

Getting Acquainted with the Software

One of the things you may be wondering about is how to integrate software into the curriculum. The first level of comfort in getting acquainted with computers is to start with the known. Integrating computers with the whole-language approach may seem overwhelming for those who feel it has to be done all at once. The integration process is really something teachers have been doing for years. The first level of integration — becoming familiar with computers — requires a minimum of planning. Obviously, some new content will be encountered but nothing overwhelming. Assimilating something new is fairly easy when it is done gradually. Even the approach described here is not all that new. It is just another way of looking at things.

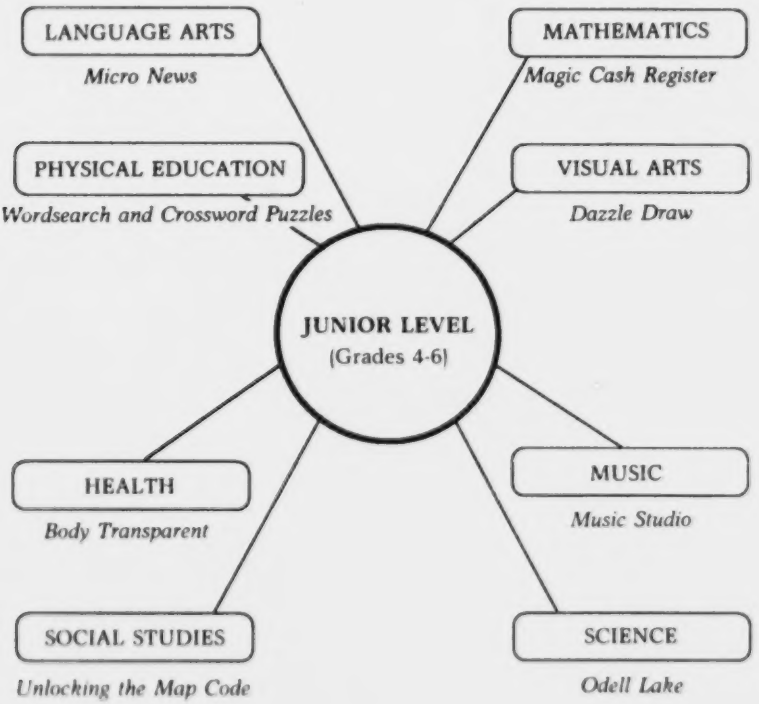
Normally, teachers have several givens — a class of so many students, a certain grade level, and a responsibility for teaching certain subjects. The first level of integration allows you to work within these familiar parameters. The immediate task is to locate a piece of software that will go with one of the subject areas. Often, one piece of software can be used in more than one subject area. Even if the school or class library of software appears small, it will probably have enough to allow a fair amount of integration right away.

The nature of a school's software collection enables some subject areas to be more readily matched than others. In the short term, however, consider starting with what you have found. The software's subject should not prevent its creative use in another subject area. For long-term plans, you may want to order or purchase software as it becomes available. Software catalogues can be useful as sources of subject-related programs. Computer consultants are good resources for both available and upcoming software.

Drafting a Software WEB

A visual organizer, the software WEB, is used to begin to integrate computers across the curriculum. If a class is at the Junior Level (Grades 4-6), its curriculum will probably include visual arts, health, language arts, mathematics, music, physical education, science, and social studies. With the grade level in the middle of the WEB, the subjects will radiate from the centre. A software catalogue may list a number of different pieces of software in each subject area. The name of the software is then placed under its related subject area. A list of the software mentioned here and in other chapters is located at the back of the book. A junior level software WEB might look like the model on this page.

Software WEB



Once the software in each of the areas has been located, preview it and read the documentation. The next step is to decide how the software relates to the content, and how it can be used to implement specific objectives. The extent of the matching process, of course, depends on available software and time constraints. The matching can be done for one or more subject areas from time to time as it fits in with the classroom program.

The software in the WEB relates to the various subject areas in the following ways: ***Micro News***, a newspaper production program, can be used for written expression. ***Magic Cash Register*** simulates a cash register and can be used when working with money. ***Dazzle Draw*** is a drawing program for creating artwork. ***Music Studio*** has sound and pictures which can be part of a music program. ***Odell Lake*** is a natural science program in which children make ecological decisions. ***Unlocking the Map Code*** covers geographical concepts which can be used to reinforce map symbols, direction, and scale. ***Body Transparent*** is a physiology program useful in teaching about human organs and bones. ***Wordsearch and Crossword Puzzles*** are utility programs which are described in more detail below.

Wordsearch and Crossword Puzzle Software in Physical Education

Computer software may even be integrated into physical education curriculum. One way is to use wordsearch or crossword puzzle programs. In wordsearches, students are given a list of words and are then directed to locate them hidden in an array of letters. Crossword puzzles have clues placed horizontally and vertically in a grid. Students use these clues to fill in the spaces. Computer programs designed to generate these puzzles are extremely versatile, relatively simple to use, and have a positive effect on the students using them.

Who would think of using computers in track-and-field? When spring draws students out of the gym and on to the track, here are some excellent ways to relate computers to practice sessions. As a culmination after a series of track-and-field lessons, a brainstorming session could produce a list of words, such as *stride, relay,* and *sprint*. These words can be written on the blackboard or chart paper. Small groups of students would then work at the computer with the word list while other groups work on other tasks. Students can load the wordsearch program disks into the disk drive and take turns typing their words on the keyboard.

The way programs organize input varies. Entered words can be deleted immediately if students have changed their minds or made a mistake (great for novice typists). In some wordsearch programs the computer then lists the entries from the longest to the shortest word before setting up the puzzle. Program options are available to control the level of difficulty by determining the size of the puzzle and the directions of the hidden words. Completed wordsearches and answer keys can be printed.

A follow-up computer activity is to design a track-and-field crossword puzzle. Each student would develop a definition or clue for one of the previously listed words, using resource materials such as books and magazines as well as personal experiences. The students' meanings and spellings should be checked before the final crossword is designed. Students can load the crossword program and then independently enter their clues so that the class does not see them. The program automatically organizes the words in an across-and-down format. Printouts of the puzzle and the answer key are available.

The class can enjoy solving its own puzzles, perhaps with partners or in small groups. Alternatively, this school activity may be extended into the home if students are encouraged to discuss the printouts with their families. The wordsearches and crosswords provide a great recreational focus for sharing knowledge about track-and-field, as well as computers, with parents and others. Their enthusiasm will be catching and may even prompt them to obtain educational programs for home use, as many families and individual students often have their own computers.

Suggestions to extend computer enthusiasm:

- Have two classes use the software, trade their printouts, and correct the completed work of the other class.
- Display the answered puzzles, along with the students' track-and-field pictures, on a classroom bulletin board.
- Enlarge the puzzles and post them surrounded by current track-and-field articles for students to ponder at leisure.
- Submit a track-and-field wordsearch or crossword puzzle for the spring issue of your school's newspaper.

Students, being naturally curious about the computer's process of setting up the puzzles on the screen, are highly motivated to interact with computers, in this case, using wordsearch and crosswords. Their computer literacy is enhanced by their opportunity to use computers in varied and creative ways. More importantly, all aspects of communication are involved in this whole-language program: reading, listening, viewing, writing, speaking, and representing. Wordsearch and crossword puzzle programs can become powerful pieces of software, promoting your students' "active learning" and helping to clear some "computer-integration hurdles" in physical education.

Almost any subject area could be treated in the same fashion. The wordsearch and crossword puzzle software used in this example is in the public domain and is readily available for many computers. However, for those wishing to purchase commercial software, two versions, ***Wordsearch*** and ***Crossword Magic*** are available.

Benefits of Integrating Software with Curriculum

Using one piece of software in one subject area is the first step in integration. Without changing your curriculum, you will have added a new dimension and gained a valuable learning experience. Familiarity with that first program helps when searching for other software, because future judgments can now be based on successful, personal experience.

Computer awareness will also be heightened. By getting to know how software needs mesh with the available resources, you can make more informed choices when ordering software. The most important benefit of that first experience, however, is the opportunity to witness how students react while working at the computer. Leaving yourself open to the ways in which students use software encourages new ideas that can be generalized to other software and subject areas.

Remain in Step One as long as necessary, for it offers considerable scope for valuable computer integration. When you are ready to become more adventuresome, the knowledge gained and the attitudes developed in this step will serve as excellent preparation for the next one.

5. Step Two — Using Theme-Related Software

Once you have used one piece of software and have become comfortable with your new-found computer literacy skills, a second level of comfort awaits. This second step in the integration process involves using theme-related software. Based on the experience of locating software in Step One, you may have gained an idea of what is available and have begun to create your own guidelines. Applying software in one subject area may spark an idea for another area. This heightened awareness helps in the evaluation of prospective software.

Step Two is an opportunity to incorporate new approaches or new ways of looking at curriculum. Because theme development includes several subject areas, it requires careful planning. Teachers who have already done theme planning are quite familiar with thinking across subject area boundaries. Step Two involves injecting a software component into subject areas while at the same time staying within a theme.

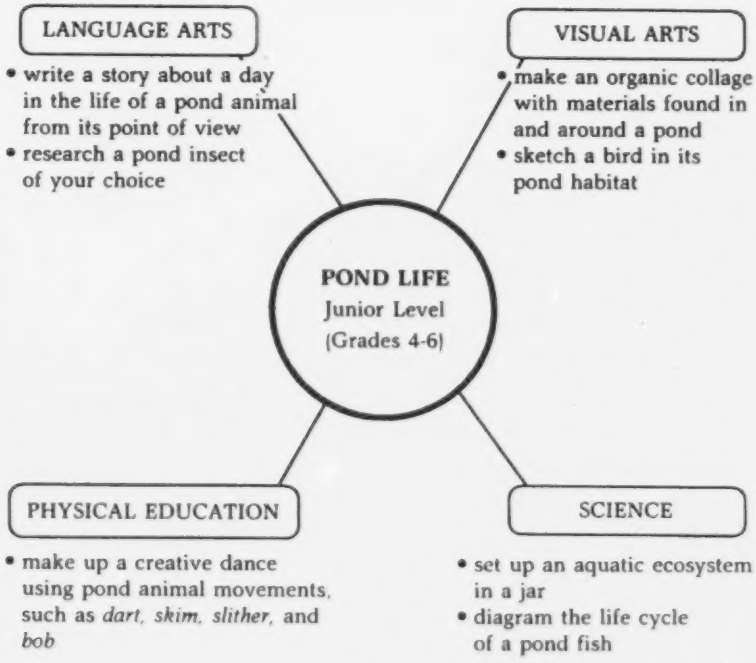
In Step One the software stood alone. It was independent. It did not have to relate to a theme. Since it merely related to some aspect of the subject area, you had no difficulty making a match. In Step Two, the software not only needs to relate to a subject area but also must correlate with a theme. Therefore, you must be more selective in order to chose the specific piece of software that will suit the established criteria. It may not always be possible to match a piece of software with each subject area within a particular theme. A broader theme can encompass more software. The extent of the computer component depends on available software and the scope of the theme.

Theme Building

Theme building can be exciting. A kernel of an idea suddenly leads in all directions. It is always interesting to see where the building process will go. It is even more exciting when students are involved, because they bring to the theme varied experiences and interests and frequently generate ideas which lead in new directions. Organizing their ideas into a workable planning tool can be difficult, but webbing helps.

The following example is similar to what a teacher usually does. Together with the students, the teacher decides that the class theme will be *pond life*. Through a brainstorming session, the words are listed and ideas for activities are discussed in small groups. When the groups report to the whole class, the ideas they like best are categorized by subject area and put into WEB format. As the students discuss their ideas, the teacher records them in the WEB, weighing the responses and enthusiasm the students have generated. This helps determine the subject areas that will allow students to pursue both their own interests and curriculum objectives. The resulting WEB might look like this:

Theme WEB


LANGUAGE ARTS
• write a story about a day in the life of a pond animal from its point of view
• research a pond insect of your choice
VISUAL ARTS
• make an organic collage with materials found in and around a pond
• sketch a bird in its pond habitat
POND LIFE
Junior Level
(Grades 4-6)
PHYSICAL EDUCATION
• make up a creative dance using pond animal movements, such as *dart, skim, slither,* and *bob*
SCIENCE
• set up an aquatic ecosystem in a jar
• diagram the life cycle of a pond fish

Adding a Software Component

In general, up to the point where the activities are selected, there is no difference between regular theme building and theme building with a computer software component. After the theme has been established, select one or more of the subject area activities in which to include a piece of software. Depending on the nature of the software, you can use it as an end in itself or as a starting point for subsequent activities. Building a software collection is similar to accumulating print material on a theme.

Software collection hints:

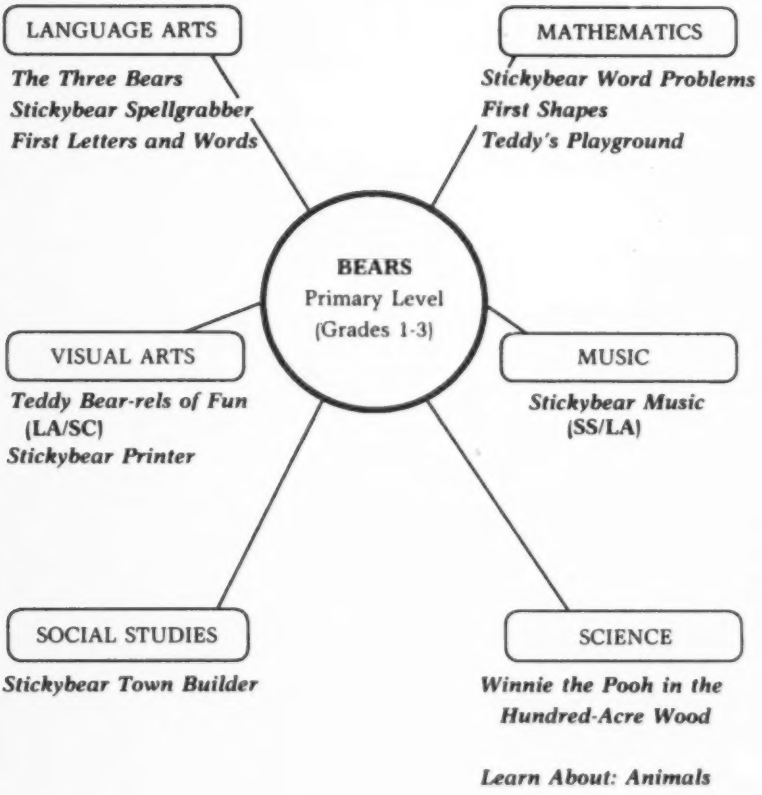
- Talk to colleagues, parents, and students.
- Involve resource people, such as school librarians and computer consultants.
- Read catalogues from educational publishers and software distributors.
- Subscribe to computer and educational magazines.
- Contact software development companies.
- Attend computer conferences and trade shows.

The actual purchase of software may be the largest hurdle! If the school has budgeted funds, you can recommend software acquisitions. Collecting theme-related software is a gradual process. The expense can be justified because the software reinforces a subject area within a theme and might even serve double duty in other subject areas. Even when the theme has been covered, the software will continue to have other uses in a wider curriculum.

A WEB, similar to the one used for the *pond life* theme, will help organize the basic concepts. With the new theme, however, software components are included. The names and descriptions of several pieces of software that relate to the theme have been located with the help of a software catalogue. After previewing the software and reading its documentation and reviews, list the

software under appropriate subject areas. The software web for a *bears* theme at the Primary Level is slightly more complex than the one for *pond life*. A variety of software, all of which are listed at the back of the book, is assigned to the subject areas of language arts (**LA**), mathematics (**MA**), music (**MU**), science (**SC**), social studies (**SS**), and visual arts (**VA**).

Software WEB



Once the WEB is drawn, look more closely at the two pieces of software coded for second-subject use — ***Teddy Bear-rels of Fun*** and ***Winnie the Pooh in the Hundred-Acre Wood***. Suggested activities, first in a main subject area and then in the others, are provided for classroom use.

Teddy Bear-rels of Fun

The WEB lists this software under visual arts because of its graphics. It consists of two parts. The first, *Teddy's Art Shop*, contains picture backgrounds, graphics called "props", and bear characters, as well as thought and speech bubbles. The second part, *Teddy's Library*, has additional backgrounds, graphics, borders, and typefaces. Students can create scenes and enter cartoon-style dialogue. Different-sized printouts can be obtained. The program is easy to use, especially since the choices are presented in menu format.

Main Subject Area — Visual Arts

Young students will enjoy creating original jigsaw puzzles, using scenes composed with backgrounds, characters, and props. Once they have obtained their printouts, they may wish to color them and glue them to cardboard. By reversing the cardboard, they can draw and cut out jigsaw puzzle pieces to challenge their friends.

Another Subject Area — Language Arts

Some students might be interested in creating puppets for a dramatization. They can obtain printouts of characters and props that can be colored and mounted on craftsticks. The puppets may be laminated for durability. A large "poster" printout of one of the backgrounds can be their scenery. Students can use their puppets and scenery to explore feelings and personalities of their puppet characters through improvised dialogue.

Another Subject Area — Science

Students may wish to connect the graphics of this program with research on bears. They could obtain a printout of a background which shows a season to depict the bears' natural habitat. Pictures of bears could be cut out and pasted on to the background and accompanied by brief descriptions of the bears' habits during that season.

Winnie the Pooh in the Hundred-Acre Wood
This program is listed under science in the WEB because of its weather elements and woodland setting. On the surface, the program is obviously connected with map skills and literature. The program has an off-screen paper map that students can use along with the on-screen one. The computer automatically hides ten different objects belonging to Christopher Robin and his friends. Students must find and return these possessions to their rightful owners who live in different parts of the woods. A blustery wind and a mist thwart their efforts.

Main Subject Area — Science
Pairs of students may wish to identify the two weather conditions in the program and relate them to their own experiences. They can record their observations of what happened when they were in the woods returning the objects. For comparison, they might record their observations of a windy or foggy day, noting similarities and differences between the computer and the real-life situations.

Another Subject Area — Social Studies
Interested students might like to play a "giving directions game." They can create their own floor map using symbols from the map which they have enlarged, colored, cut out, and mounted on cardboard. The cardboard symbols can then be scattered around the floor with North indicated. Students take positions on the map and give directions for their partners to join them from another position. They may wish to invent variations of this game.

Another Subject Area — Language Arts
Some students may enjoy creating poems based on their search in the woods. As matches are made, they may list the possession/owner pairs. A selection of their favorite pairs can be used for the poems. They may even want to set their poems to music.

6. Step Three — Integrating Computers with Whole Language

Step One integrated software in a subject area; Step Two integrated software in a theme. In each step, webbing visually represented the overall plans and the content. Suggestions were given on ways to identify appropriate software and how to correlate individual software, which may or may not be related primarily to a theme, to subject areas.

In addition to the strategies recommended in the first two steps, Step Three introduces methods to help you integrate computers into the whole-language classroom. The WEBS will include all subject areas and learning modes. To ensure that all modes are represented, Step Three will use matrices. Finally, pre- and post-computer activities are suggested as the way to put computers into the whole-language context. The strategies will be implemented through three pieces of versatile software — graphics/text software, word processing, and simulations. These are viewed as generic, because even though specific pieces of software are used, the ideas are transferable to other similar ones.

Whole-Language Software WEBS

The visual organizer, or WEB, will be modified to reflect whole-language thinking. Since the focus in Step Three is a particular piece of software, its name will occupy the centre of the WEB. If a theme is attached, it can be included here also. All subject areas are included in these WEBS in order to provide maximum integration.

The suggested activities listed under each subject area are coded according to a predominant learning mode — Reading (**RD**), Listening (**L**), Viewing (**V**), Writing (**W**), Speaking (**S**), and Representing (**RP**). Although many activities are often a mixture of modes, to simplify the examples the emphasis has been placed on one mode. As planning tools, WEBS should be flexible enough to respond to curriculum planning needs.

Teacher Planning Matrix

When planning curriculum, teachers often find that organizational tools such as a matrix are useful. A matrix is a flexible tool which gives a quick overview of planning. Two ways of using it are explained: A *Teacher Planning Matrix* and a *Student Learning Matrix*. The Teacher Planning Matrix is used while developing units to ensure overall balance, while the Student Learning Matrix is used as an individual student monitoring/evaluation tool. You may wish to adapt the matrix concept to suit specific needs when developing, planning, and monitoring student activities. All receptive and expressive modes of learning are included in the matrix, as well as the subject areas of health (**H**), language arts (**LA**), mathematics (**MA**), music (**MU**), physical education (**PE**), science (**SC**), social studies (**SS**), and visual arts (**VA**).

After developing a WEB of possible learning activities, you would use a planning matrix, such as the one on page 55. With learning modes down the side and subjects across the top, the resulting boxes provide a place for you to check the planned learning activities. The theme and/or piece of software that is the focus of the unit is recorded at the top. The learning opportunities on the WEB can then be plotted in the appropriate boxes on the matrix. For example, playing a soundscape of zoo sounds might be plotted as a dot or check mark in the box where science and listening intersect.

In the Teacher Planning Matrix on page 55, the activities from the WEB in Step Three are placed in a matrix to show how to implement a theme and a piece of software, ***The Print Shop®***, through the whole-language approach. The matrix shows the activities at a glance. The intersection boxes indicate learning opportunities which can be implemented with various activities.

Once all the activities have been located in the matrix, an overview of all the subjects and learning modes is possible. The overview assures the planner that all the bases have been covered. The nature of the theme, the content of the software, and the student interests may result in a matrix overloaded in certain areas. This can be balanced in several ways. You may choose to balance the range of activities on the particular theme or unit, or address those areas that are left out when planning other themes or units. If the latter route is chosen, putting the matrices on transparencies will allow them to be used as overlays. The

Teacher Planning Matrix

Theme: General Application Software: *The Print Shop®*

SUBJECTS

LEARNING MODES		Health (H)	Language Arts (LA)	Mathematics (MA)	Music (MU)	Physical Education (PE)	Science (SC)	Social Studies (SS)	Visual Arts (VA)
RECEPTIVE	Reading (RD)		•						
	Listening (L)		•						
	Viewing (V)				•	•	•	•	•
EXPRESSIVE	Writing (W)	•	•	•	•		•	•	
	Speaking (S)		•						
	Representing (RP)			•				•	•

Date: _____ Comments: _____

layers will then clearly show the activity distribution and facilitate checking for balance.

Below the matrix, there is a line on which to record a date — either a specific date or a general time frame, such as October-November. Space is also provided in which to jot down relevant information before, after, or during the time spent on the unit. Books, resources, field trips, and things that worked or did not work are worth noting for future planning. A blank copy of this matrix as a blackline master is provided on page 57.

Student Learning Matrix

As a model, the Teacher Planning Matrix may be used to develop a Student Learning Matrix to monitor or evaluate individual student progress. Challenge in a variety of learning activities will allow students to develop by drawing upon a broad experiential base. Their involvement in a listening-science activity, for example, will differ from that in a speaking-health activity. Diversity arises from such combinations of learning modes and subject areas.

A learning matrix can be created for each student. By recording completed activities, you can gain an overall view of student participation. This will also give an indication of the activity balance within and between themes. Individual differences may also be considered. If a student has difficulty writing, expectations may be tempered so that perhaps only one writing activity would suffice.

As in the Teacher Planning Matrix, the learning modes are placed down the side and the subjects across the top to create boxes to check. The theme, software, student's name, and date or time period are noted at the top.

As each student completes a learning activity, it is noted in the matrix. At the end of the unit, the matrix will indicate all areas the student has covered. As a monitoring tool, you may use check marks or dots for different purposes. If the dots are color coded to go with each theme, the same matrix may be used throughout the year.

Teacher Planning Matrix

Theme: _____ Software: _____

SUBJECTS

LEARNING MODES		Health (H)	Language Arts (LA)	Mathematics (MA)	Music (MU)	Physical Education (PE)	Science (SC)	Social Studies (SS)	Visual Arts (VA)
RECEPTIVE	Reading (RD)								
	Listening (L)								
	Viewing (V)								
EXPRESSIVE	Writing (W)								
	Speaking (S)								
	Representing (RP)								

Date: _____ Comments: _____

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If the matrix is used for evaluation purposes, it can be modified to make it more useful. Several ways are possible. An evaluation code, such as G for Good, F for Fair, and P for Poor may be used for completed activities. This may be placed on the line provided at the bottom of the page. Another option is to attach numerical values to the code, for example. G=3, F=2, P=1. Keeping an ongoing tally is a major evaluation timesaver. In any of these ways, the Student Learning Matrix serves as a student record sheet. A blank copy of this matrix as a blackline master is provided on page 59.

Student Learning Matrix

Theme: _____ Software: _____

Student's Name: _____ Date: _____

SUBJECTS

LEARNING MODES		Health (H)	Language Arts (LA)	Mathematics (MA)	Music (MU)	Physical Education (PE)	Science (SC)	Social Studies (SS)	Visual Arts (VA)
RECEPTIVE	Reading (RD)								
	Listening (L)								
	Viewing (V)								
EXPRESSIVE	Writing (W)								
	Speaking (S)								
	Representing (RP)								

Evaluation Code: _____ Comments: _____

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LEARNING TOGETHER: COMPUTER-INTEGRATED CLASSROOMS by Kathlene R. Willing and Suzanne Girard.

Three Stages of Computer Activities

The whole-language process generally involves three stages. The teacher **activates** students' prior knowledge before starting something new, allows the students to **experience** it, and then encourages them to **respond** to the ideas by reading, writing, listening, speaking, viewing, and representing.

PRE-COMPUTER ACTIVITIES

Pre-computer activities are the **activating stage** in the integration process. This is the opportunity to prepare students to use the computer and the software. The teacher activates students' prior knowledge about the content of the program and introduces computer literacy skills relevant to its use. Helping students relate in advance to what the program has to offer allows them to get the most out of the program. Computers are not necessarily required.

Students will benefit from a variety of pre-computer activities that provide opportunities to:

- demonstrate prior knowledge
- become aware of new ideas and concepts
- learn new vocabulary
- relate real-life products to computer-generated ones
- develop cause-and-effect thinking

Software Content

- understand special keys and screen displays
- develop sequential thinking
- learn new vocabulary
- demonstrate computer awareness.

Computer Literacy

AT THE COMPUTER

The "hands-on" nature of being at the computer is the **experiencing stage**. This is a great opportunity to engage students in a rich, stimulating environment integral to whole language. Coming to

it with the knowledge and experience activated during the previous stage, they are thus able to apply what they have learned and become proficient in operating the software. One way to create this kind of environment is to provide students with a variety of situations for working at the computer. They may work at the computer individually, in pairs, in small groups, or as a whole class. However, opportunities to interact in small groups at the computer encourage the use of all modes of learning and cooperative behavior, as discussed in chapter 1.

POST-COMPUTER ACTIVITIES

Post-computer activities are the **responding stage**. This is the opportunity to allow students to extend their use of the computer and the software which they have explored in the previous stage. The activities are designed with a purpose and an end product in order to reinforce understanding of the software content. Since the modes of learning and the subject areas are important here, teaching activities are organized under the headings of Receptive and Expressive Modes and coded according to subject area. Such a structure provides a framework for computer integration, because many of the activities include use of a computer. This aspect of post-computer activities encourages flexibility.

Post-computer activities provide opportunities for students to:

- engage in personal responses
- use all learning modes
- demonstrate subject area expertise
- use the computer purposefully
- extend and apply skills and knowledge.

7. Graphics/Text Software and Whole Language

Graphics / text software is a kind of "art" software. It allows the creation of banners, greeting cards, posters, advertising materials, and stationery. Items of special interest to teachers include awards, worksheets, announcements, calendars, and progress reports. The programs have "clip art," or graphics, that can be "pasted" electronically on to the items being designed. The resulting printouts can be used in a variety of ways.

This kind of software is motivating to use and is an easy introduction to computers for first-time users. By following specific sequences and making simple decisions, teachers and students are quickly rewarded with useful, finished products. Graphics / text software also lends itself to a wide range of classroom activites and can be used with students of different ages and abilities. Some examples of this software include ***The Print Shop®***, ***Print Magic***, ***SuperPrint***, and ***Stickybear Printer***.

Tips to increase student's competencies with graphics / text software:

- Teach several students a particular procedure so that they can tutor others.
- Post procedures, special vocabulary words, and sample menus in the computer centre.
- Use preview options to check work before printing.
- Unless it's necessary to have solid lettering, select outline print option to save printing time.
- Laminate graphics documentation sheets and make them available for students at the computer.

The Print Shop® Overview

The Print Shop® is an excellent example for creating teaching ideas from graphics/text software. Although it is only one program in the genre, it lends itself well to a generic approach for integration suggestions. It is commonly found in schools and is readily available on a number of computers. For first-time users, both teachers and students, its limited capabilities make it a relatively simple program to grasp. Instructions and menus are easy to follow and help in the selection process. The documentation gives examples of how to make various items. Few keystrokes are needed to complete tasks. Both teachers and students using a computer for the first time often find this software genre breaks the ice, making computers appear more friendly.

The Print Shop® produces a wide range of finished products. Students can make banners, greeting cards, posters, advertising materials, and stationery. Teachers can create awards, worksheets, and announcements. Its "clip art," or graphics, includes animals, people, holidays, sports, occupations, decorative borders, and a range of typefaces, known as fonts. Although the placement and size of the type is limited, text can be printed along with the graphics.

A number of partner programs increases its capabilities. ***The Print Shop Companion***®, for example, enables users to make custom calendars and contains additional typestyles and borders. Other disks contain different graphics libraries which provide a variety of fonts, graphics, designs, and patterns. One even has special occasion and holiday clip art.

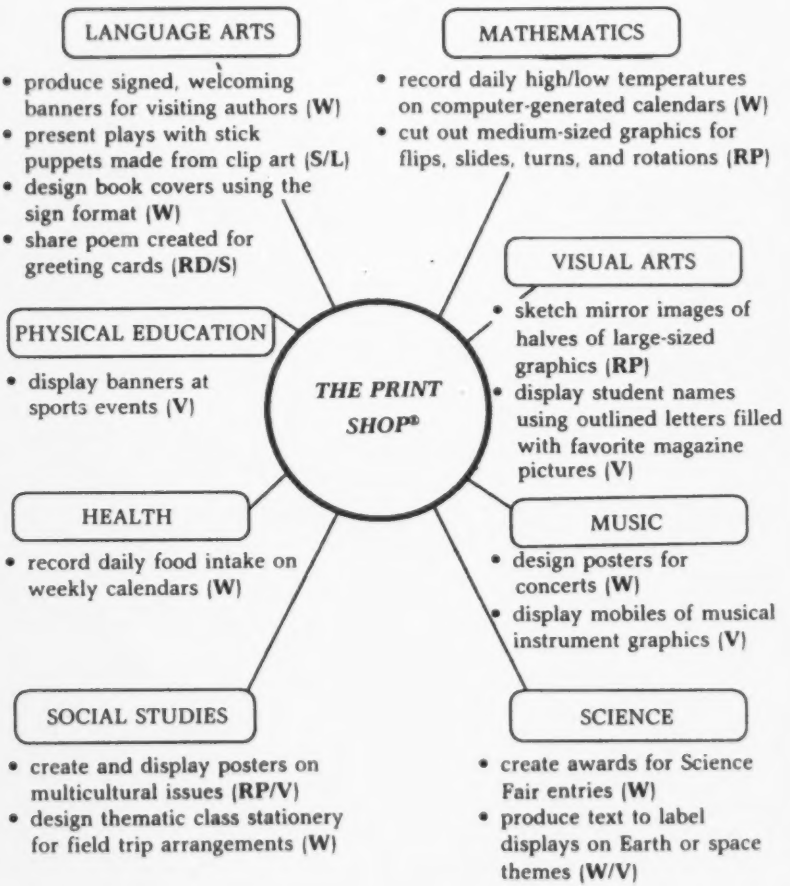
Springboarding the Software

Springboarding ideas from any software is made easier with a visual organizer — in this case, a WEB. The topic or focus goes in the middle. Since the software is the focus, its name would be written in the middle of the WEB. Radiating from the title are the subject areas to be covered. Learning opportunities for the different subject areas may then be generated as part of the WEB. Both modes of learning are included: the receptive mode — Reading (**RD**), Listening (**L**), and Viewing (**V**), and the expressive mode — Writing (**W**), Speaking (**S**), and Representing (**RP**).

In this WEB, they are included along with the subject areas of health, language arts, mathematics, music, physical education, science, social studies, and visual arts.

The sample WEB on this page is not related to a theme, and the activities generated are aimed at all elementary grades. However, the WEB could be made specific to a grade level. Other software in the school could be used in similar ways. The following WEB is an example of how adaptable one piece of software can be.

Software WEB


LANGUAGE ARTS
• produce signed, welcoming banners for visiting authors (W)
• present plays with stick puppets made from clip art (S/L)
• design book covers using the sign format (W)
• share poem created for greeting cards (RD/S)
MATHEMATICS
• record daily high/low temperatures on computer-generated calendars (W)
• cut out medium-sized graphics for flips, slides, turns, and rotations (RP)
VISUAL ARTS
• sketch mirror images of halves of large-sized graphics (RP)
• display student names using outlined letters filled with favorite magazine pictures (V)
PHYSICAL EDUCATION
• display banners at sports events (V)
THE PRINT SHOP®
HEALTH
• record daily food intake on weekly calendars (W)
MUSIC
• design posters for concerts (W)
• display mobiles of musical instrument graphics (V)
SOCIAL STUDIES
• create and display posters on multicultural issues (RP/V)
• design thematic class stationery for field trip arrangements (W)
SCIENCE
• create awards for Science Fair entries (W)
• produce text to label displays on Earth or space themes (W/V)

Pre-Computer Activities for *The Print Shop®*

The following pre-computer activities have proved useful with both younger and older students:

- To activate prior knowlege, students would list all the occasions on which they might send greeting cards. They can be encouraged to talk about their favorite greeting cards and why they like them.
- Younger students could bring greeting cards to share with their classmates. They can unfold and analyze the cards for the location of text and graphics.
- Interested students could create a display of the steps in folding greeting cards, using blank sheets of paper labeled with the inside and outside parts of the greeting cards, as shown on the computer screen.
- Older students could create a display of greeting cards, labeling and categorizing their collection. Encourage them to deal creatively with overlapping categories.
- To provide students with a dramatic example of the use of a banner, marching band music would be useful. The students would listen with their eyes closed, visualizing a parade and imagining a banner they would like to see leading the way. Students could work in small groups to describe their banners.
- Some students could compile scrapbooks or albums with various business cards and letterheads. They may want to create a "printing company" name for their group and then design a cover for their "company's" book of samples.
- Young students would enjoy a "Poster Hunt" around the neighborhood. A camera would be useful for taking pictures of posters in store windows, banks, or offices. Students could talk about the posters as they notice them, pointing out the various kinds of information. Older students may wish to critique the most effective poster they saw, commenting on the design, visual appeal, and pertinent information.

At the Computer with *The Print Shop®*

Since ***The Print Shop®*** menus are straightforward and the students are going to make one product at a time, results can be obtained quickly. This ensures that the computer can be used by the maximum number of students. If pressed for computer time, some pre-design work could be explained before the students go to the computer.

A program such as ***The Print Shop®*** is a good vehicle for pairs of students to practise decision-making. Every step involves making choices which can enhance the communication skills mentioned in chapter 1.

Use of ***The Print Shop®*** can be diversified to suit the needs of students working in a variety of situations:

- Individuals may become experts on one procedure and then teach it to students from other classes.
- Pairs of students may design a poster with one person entering the information and the other selecting a border and getting the printout.
- Small groups may work collaboratively on banners for class themes.
- The class may decide on greeting card designs for the outside and then write individual verses to go inside.

While students are working in pairs and in small groups, you will have many opportunities to observe and evaluate communication and problem-solving skills. Sample checklists are included in chapter 1.

Post-Computer Activities for *The Print Shop®*

The Print Shop® lends itself to different classroom and school activities and events. These responding activities can take place after the students have gained experience with the software. By their nature, many activities involve more than one learning mode, but to provide focus, the listed activities have been classified in their *dominant* mode. They have also been coded by their *main* subject area.

RECEPTIVE MODE

Reading: Researching Technology (SC)
Older students could research the printing process from clay tablets to computers. They could then produce a banner or a poster to summarize their topic, perhaps in a slogan such as "From Stylus to Daisywheel!"

Listening: Listening to a Musical Selection (MU)
Younger students may revisit an imaginary parade by playing the marching music used in the pre-computer activity. They could create a banner like the one they visualized and stage a parade to the music.

Viewing: Creating a Poster Gallery (SC)
Interested students would enjoy generating posters on a recycling theme. They could color and mount them, inventing structures from recycled materials to complement their posters. The posters and structures could be displayed prominently in a main school area.

EXPRESSIVE MODE

Writing: Creating Greeting Cards (LA)
Creating their own greeting cards is an activity many students enjoy. They can then share them with friends and family to celebrate holidays or special days.

Speaking: Making a Presentation (PE)
Students could prepare and deliver a short speech about a school athlete to be honored at an awards assembly. Individualized sports certificates may also be produced.

Speaking: Conducting a Survey (MA)
A survey on how computers are used in their school — for writing reports, designing posters, or researching projects — would be a concrete mathematics activity. Students could even design a banner announcing the survey and a poster sharing their findings with students and teachers who participated.

Representing: Planning a Field Trip (H)
A field trip to a senior citizens' residence or a children's unit at a hospital would be a worthwhile excursion. To help plan the

trip, committees would discuss the time, date, parent volunteers, contact person, and transportation. They may even design their own stationery to use for their correspondence.

Representing: Creating Holiday Ornaments (VA)
Students could select a variety of clip art related to a holiday theme. They could also cut out and color individual graphics from the completed printouts and use them to decorate the classroom.

8. Word Processing Software and Whole Language

With word processing software, computers become sophisticated typewriters. As with a typewriter, text is entered into the computer. In addition, it is "processed" or worked on before producing printouts. Word processing lets the user write a document, move words, paragraphs, or even whole pages, and then print letter-perfect documents.

Although basic word processing functions, such as moving and editing text, are contained in most word processing packages, some programs may be more powerful than others. Many features may be different. Packages designed for young students generally have straightforward features, while those designed for business have numerous and complex ones.

Simplified programs make word processing accessible to younger students. Their simple text-manipulation capabilities are easy to learn, and they may include such features as drawing, clip art, music and/or animation. The more sophisticated packages may be harder to learn since they have complex keystrokes or function keys and include features such as full-text editing, special formatting, and on-line spelling checkers.

Tips to increase students' competencies with word processing software:

- Post important editing commands in the computer centre.
- Introduce word processing by modeling, writing, and editing through a class language experience story.
- Work intensively with a small group of students who can become experts and help others.
- Present short lessons to the class followed by work on the computer in "expert-beginner" pairs.

Word processing software is available for and can be used with students in all elementary grades. For younger students in the primary grades, word processing software with graphic capabilities include ***Kidwriter***, ***Snoopy Writer***, and ***Kid Pro Quo***. Students in the junior grades can learn slightly more powerful, yet easy-to-use word processing packages like ***Bank Street Writer***, ***Paperclip III***, and ***Storytree***. Older students and those in the intermediate grades could be challenged with ***Appleworks***, an integrated word processor, database, and spreadsheet program.

Kidwriter Overview

Kidwriter is a good example for demonstrating that word processing can be done by young students in the primary grades. This program is readily available for many kinds of computers. Although the ideas shown are for the primary grades, they can be applied to the use of other word processing software. ***Kidwriter*** is a jumping-off point, for many of the activities are "generic" — they can be seen as concepts to use with other software in the same genre. Teachers who do not have ***Kidwriter*** will discover that other word processing software can be conceptualized and used in the same way. Teachers of older students may wish to incorporate a drawing program, such as ***Dazzle Draw***, in order to provide graphics with the word processing software they are using.

Kidwriter contains clip art. It has a divided screen (two windows) on which to work. The larger graphic window at the top of the screen allows students to place and move clip art around to create pictures. Below is a text window on which they enter short stories. Hence there are really two learning opportunities with ***Kidwriter*** — creating a picture and writing a story. The first part provides an attractive way for young students, even those with little or no computer experience, to get involved. Menus for the picture part are easy to follow because students need to know only the first letter of main words, which are called

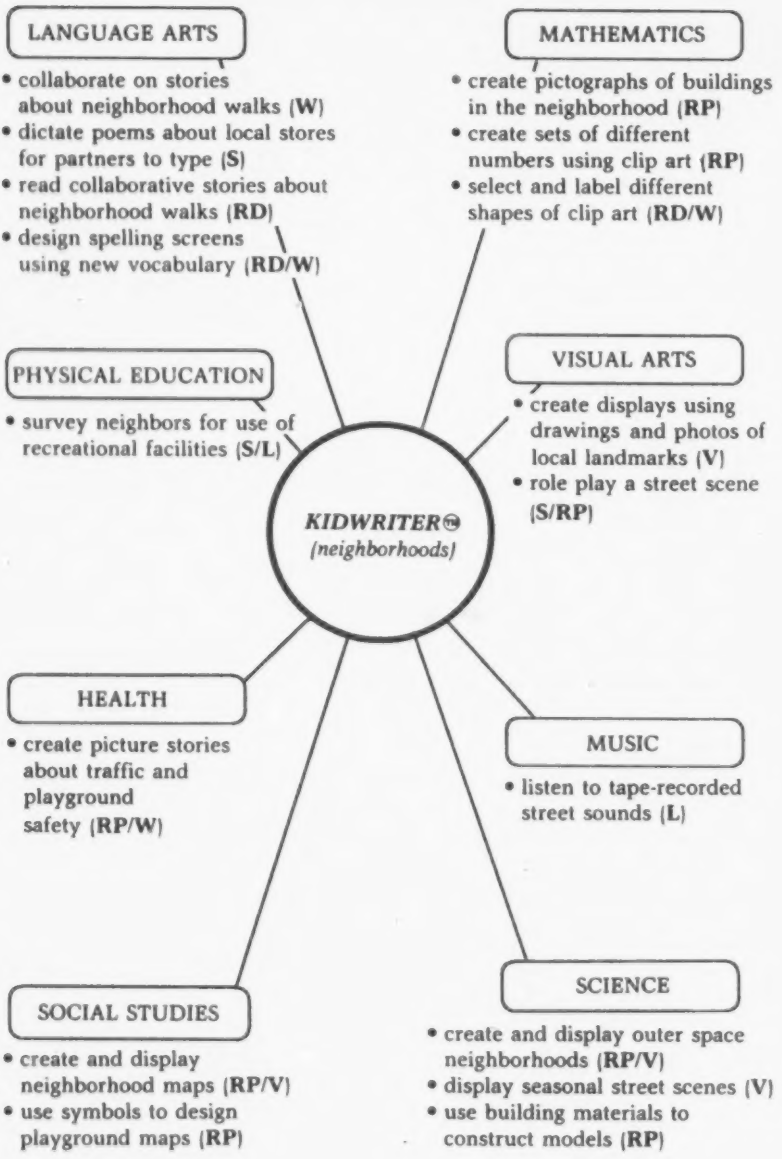
commands, to enter a choice. Selection of scenes and objects for pictures is varied enough to allow for relatively creative results. The graphics include houses, apartment buildings, churches, people, vehicles, animals, trees and plants, space objects, and a variety of geometric shapes. The picture provides an immediate student-produced stimulus for the writing. The creative writing part of the software provides opportunities for students to express themselves. Simple "edit functions" are manageable and effective. As well, other keys are consistent with ones that students would encounter as they progress to more sophisticated word processing packages.

Using ***Kidwriter***©, students create pictures with selected graphics and then write short stories based on the picture created. They can make simple edits to their text, store and retrieve their work, and get printouts. Like other finished products, the printouts can be used in many different ways. Although the program is labeled as a word processing package, its application need not stop there. With a whole-language approach it can become "springboard" software for an across-the-curriculum approach.

Springboarding the Software

Springboarding ideas using a visual organizer, the WEB, facilitates this process. The software and the theme of *neighborhoods* is a good example. Both the name of the software and the title of the theme go in the middle of the WEB. Radiating from this point of the WEB are the subjects to be covered. The learning opportunities are then generated for the different subject areas of the WEB. Both modes of learning are included, receptive and expressive. The activities generated may not use the computer directly, but they can be related to the software or theme. The WEB on the next page is an example of the adapatability of the software to the theme of *neighborhoods*.

Software WEB


LANGUAGE ARTS
• collaborate on stories about neighborhood walks (W)
• dictate poems about local stores for partners to type (S)
• read collaborative stories about neighborhood walks (RD)
• design spelling screens using new vocabulary (RD/W)
MATHEMATICS
• create pictographs of buildings in the neighborhood (RP)
• create sets of different numbers using clip art (RP)
• select and label different shapes of clip art (RD/W)
PHYSICAL EDUCATION
• survey neighbors for use of recreational facilities (S/L)
VISUAL ARTS
• create displays using drawings and photos of local landmarks (V)
• role play a street scene (S/RP)
KIDWRITER™
(neighborhoods)
HEALTH
• create picture stories about traffic and playground safety (RP/W)
MUSIC
• listen to tape-recorded street sounds (L)
SOCIAL STUDIES
• create and display neighborhood maps (RP/V)
• use symbols to design playground maps (RP)
SCIENCE
• create and display outer space neighborhoods (RP/V)
• display seasonal street scenes (V)
• use building materials to construct models (RP)

Pre-Computer Activities for *Kidwriter*©

The following pre-computer activities have proved useful with both younger and older students:

- To help students understand the general role of computer software in the writing process, ask them to think about words connected with writing. The students could name different things they write about, such as people, pictures, places, pets, and trips; and different things they write with, such as pencils, pens, crayons, and computers. After categorizing the words on chart paper, as they are suggested, encourage the students to identify the connection between the two lists. In this way they will appreciate the role of computer software.
- Students could work on activities based on teacher-prepared picture menus and a set of cards. The menus, similar to those on the computer screen, could be prepared on chart paper; the cards could be based on the initial letter of the words, which are commands on the menu. This could be done for any other special keys, such as "arrow key" and "control key" commands. Students would match the cards to the commands on the chart, simulate using the cards as keys to pick and position objects on a flannel board, and refer to the displayed charts and cards in the computer centre.
- Pairs of students could play the game "What Key Do I Need?", using teacher-prepared cards with symbols of the editing keys. They may take turns asking each other questions, such as "I need to move the cursor back. What key do I need to do this?" or "I need to move the cursor up (down, forward, to erase). What key do I need?"
- As students contribute to a story to be written on chart paper, they would discuss errors, made intentionally by the teacher, and how to correct them. During this activity they can be encouraged to notice the difference between correcting errors on paper and correcting errors on computer screens, using editing keys. The ultimate objective, of course, is to have students realize that with a touch of a key, words can be deleted, new words inserted, spelling and punctuation corrected, and sentences, even entire paragraphs or pages, rearranged. (Ideally, for this demonstration, one person would write the story on

chart paper while another would type it into a computer at the same time. The differences in editing procedures would be startlingly apparent.)

- Teacher and students could create a picture and story together. Using a metacognitive strategy, the teacher would think aloud while the story is developing in order to help students identify errors, decide on editing keys, and comment on results. Students would be invited to comment as the story develops.

At the Computer with *Kidwriter*®

Word processing can be done over several sessions, a major advantage when considering scheduling demands and students' attention spans. Better results are attained when students work in two sessions. In the first one, they compose a picture and obtain the printout. In the second, they write a story and obtain the printout. The story may then be cut out and pasted under the picture. Although this may be a lengthy process, with creative management over a period of time, students are rewarded with their own finished products.

The use of ***Kidwriter***® can be diversified to suit the needs of students working in a variety of situations:

- Individuals may work at the computer to create a picture and then write a story.
- Individuals may design a picture and then have a friend write the story to go with it.
- Pairs may collaborate on a picture and a story.
- Pairs may incorporate class themes, such as seasonal changes, neighborhoods, transportation, or animals, into picture stories.
- Small groups may explore other genre, such as poems, letters, lyrics, invitations, notices, advertisements, and then incorporate their ideas in picture stories.
- The class may compose a picture, about which individual students could write their own version.

For evaluation purposes, using one of the checklists on pages 24-26, you may wish to observe students working together.

Post-computer Activities for *Kidwriter*®

After creating picture stories, students will need time to share them with one another. ***Kidwriter***® lends itself to different classroom and school activities that can take place after students have gained experience with the software. Many of these activities, by their nature, often involve more than one learning mode. To help provide a focus, these activities are labeled with a single mode and coded by the subject area of health (**H**), language arts (**LA**), mathematics (**MA**), music (**MU**), physical education (**PE**), science (**SC**), social studies (**SS**), and visual arts (**VA**).

RECEPTIVE MODE

Reading: Publishing an Anthology (SS)
Students who would like to compile an anthology of their neighborhood picture stories would begin by forming a committee to select the stories for the publication process — proofreading and editing, printing, binding, and marketing.

Reading: Engaging in Personal Reading (H)
Younger students would enjoy reading books about neighborhood problems. An excellent choice is *The Lookout! Book: A Child's Guide to Street Safety* by Cindy Blakely and Suzanne Drinkwater.

Listening: Listening to a Tape Recording (LA)
Some students would enjoy listening to and identifying neighborhood sounds which have been recorded on tape and placed in the listening centre.

Viewing: Creating a Display (VA)
Students could display their picture stories, including related photos, illustrations, and captions.

Viewing: Touring a Sports Facility (PE)
Some students could arrange a tour of a local sports facility to see the equipment and how it is used.

EXPRESSIVE MODE

Writing: Writing Letters (LA)
Students could write letters to the school librarian to accompany the donation of an autographed copy of their anthology to the school library.

Speaking: Interviewing a Local Expert (SC)
Some students might like to interview a local expert about pollution in their neighborhood. They may work in pairs to develop questions for the interview. A follow-up thank-you letter would be appropriate.

Representing: Singing a Song (MU)
Students might enjoy listening to and singing a song about the neighborhood, such as *Who Is My Neighbor?* by David E. Walden and Lois Birkenshaw from *The Goat With the Bright Red Socks*. They might also like to make up lyrics about their neighborhood to familiar tunes, such as *Three Blind Mice* or *Row, Row, Row Your Boat*.

Representing: Creating a Pictograph (MA)
Some students might be interested in developing pictographs of neighborhood buildings. The symbols may be cut from printouts of computer clip art. Students could be asked to interpret the meaning of the graph they have designed.

Representing: Building Models (SC/VA)
Some students may build models of seasonal street scenes while exploring the physical properties of different building materials.

One day a little girl and a little boy went out to play then the boy got tired of playing.Then there parents called the little girl to come.The girl siad why and her parents said because it was lunch time so she came and ate lunch.
The End by Daphne

With permission of the publisher, Spinnaker Software.

9. Simulation Software and Whole Language

Simulation software imitates real-life situations and environments. Like word processing and graphics / text software, simulations encourage students to think in different ways and to develop a number of skills. Although a wide variety of simulations exist, from adventure games and interactive fiction to flight simulators and electronic circuitry building, they share a common feature: they are goal-oriented. In the following description they are classified roughly into two groups, narrative and physical.

Narrative simulations are like adventure games and interactive fiction. They combine interesting, illustrated storylines with sizable databases of relevant facts. Students enter imaginary worlds to interact with the characters, making reasoned decisions based on their reading and helping the characters achieve their goals.

Physical simulations use mathematical methods to model the behavior of systems from the real world. They imitate environments or systems which are difficult, expensive, or dangerous for students to experience first hand. Students interact by exploring complex concepts, making decisions, mimicking actions, or building and testing models in a readily understood, safe environment. Since physical simulations tend to be applied to technical fields, they are more suitable for older students. (For this reason a piece of narrative software is used as the model for the generic simulation.)

Many narrative simulations are classified by subject matter, but they rely on text to carry the events along. In fact, many of these programs may be considered interactive reading software. Both graphics and text contribute to the diversity of the reading experience. The text in decision-making scenarios appears in different formats — paragraphs, captions, instructions, labels, and headings. In addition, the feedback on decisions is usually in text form. Often, when graphics are added to the screens, students are highly motivated to read the accompanying text.

The reading of symbols, or icons, often an integral part of the operation of the program, may also be regarded as a form of communication because students communicate their experiences to

each other, especially when working in small groups. Their discussions about what they are reading brings another dimension to the task.

Some examples of narrative simulation software include: ***New Kid in Town, Where in the World Is Carmen San Diego?, Snooper Troops, Swiss Family Robinson***, and ***Wizard of Oz***.

Tips to increase students' competencies with simulation software:

- Introduce students to the concept of icons, or symbols, and the way they are used to select options in simulations.
- Post visual symbols of the icons on a chart in the computer centre.
- Help students learn the mechanics of the simulation by using available introductions or tutorials.
- "Walk through" sections of the simulation as an initial guide to familiarize the whole class with the program.

New Kid in Town Overview

The narrative simulation, ***New Kid in Town***, is a good example for developing teaching ideas at the Junior Level. It is part of **Redlights, Greenlights**, an extensive social problem-solving package incorporating computer software and print materials. Students make decisions from the viewpoint of a newcomer to a community. A variety of scenarios set at home, school, and play require students to deal with problem situations involving their family and friends. Scenarios, such as skipping school with a friend, encountering a fight in the hallway, and being locked out of the house, give students the opportunity to explore a variety of decisions and come to understand the consequences.

The design of ***New Kid in Town*** makes it easy to use. From the main menu, which lists the major program options, students can select "Introduction," "Using the Icons," and "Tutorial" to familiarize themselves with the program. Options such as "Start,"

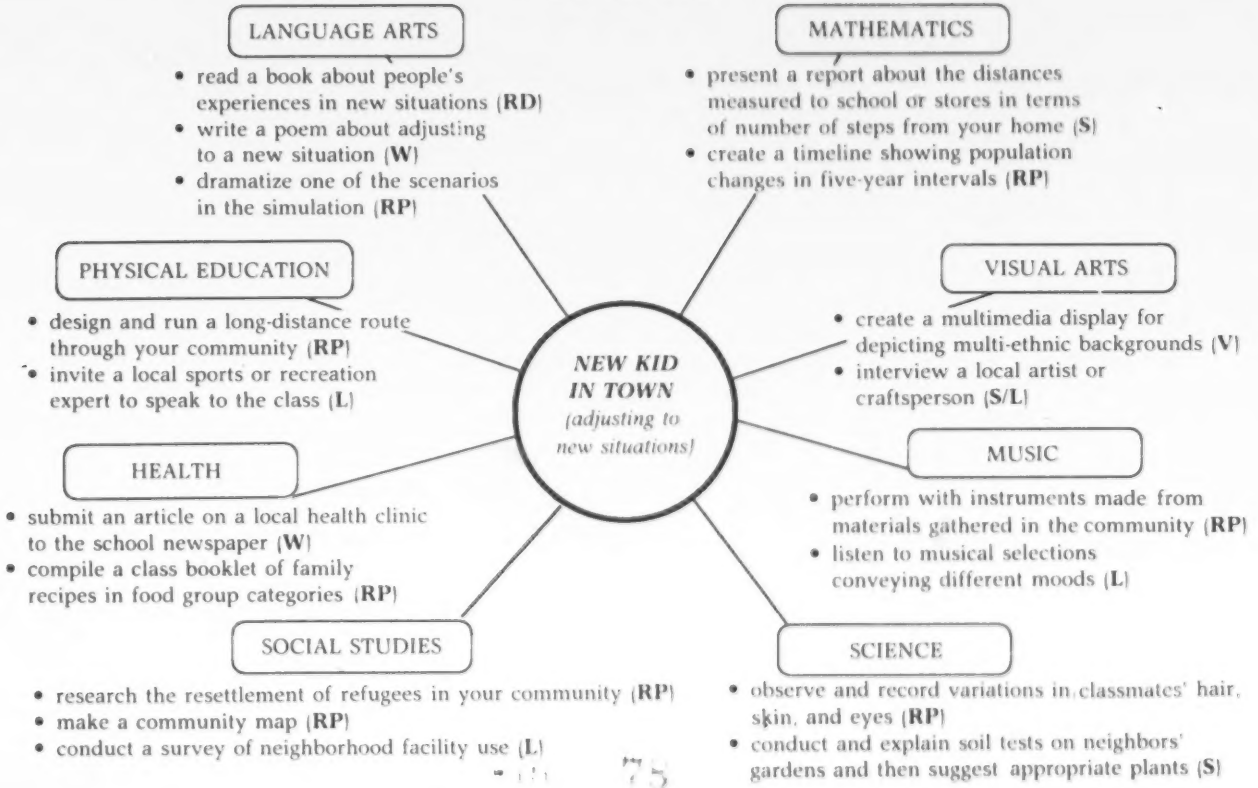
"Return," "Save," and "Exit" allow them to move in and out of the program so that they can easily pick up where they left off. Icons appearing across the top of the screen provide on-line resources, such as a dictionary and a journal. Students can access the dictionary for definitions particular to the simulation, such as *brainstorming*, *compromise*, and *consequences*. They may also enter and print out their thoughts using the journal at any time during the program. Although ***New Kid in Town*** is part of a problem-solving package, its theme and reading component make it flexible across the curriculum in a whole-language approach.

Springboarding the Software

Teaching with a narrative simulation is similar to preparing a novel study. It is previewed carefully for characters, plot, setting, and theme. The next step is to think about the "motivational hook" and how to tie everything together. Then the activities can be planned. Because of their strong reading component, many narrative simulations can be extended in a similar manner. In ***New Kid in Town***, the theme is *adjusting to new situations*. One purpose of the classroom activities, then, might be to extend that theme. An alternative would be to use the activities provided in the **Redlights, Greenlights** package. Meeting students' needs can be the impetus for developing integrated activities in a WEB similar to the one on page 82.

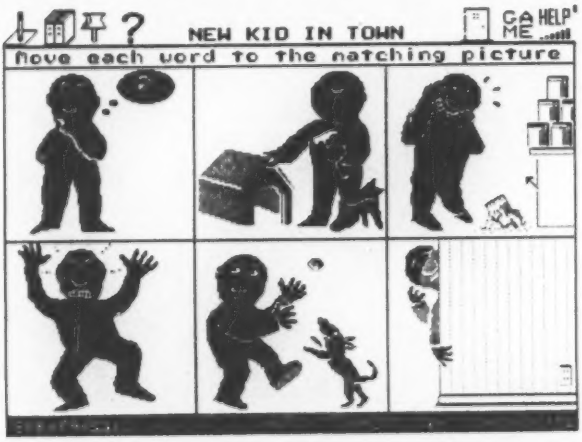
Springboarding ideas using a visual organizer, the WEB, facilitates the process. The model selected, ***New Kid in Town***, with its theme of *adjusting to new situations*, is placed in the middle of the WEB. Radiating from this are the subjects to be covered with several learning opportunities listed below them. Both the receptive and the expressive modes are included along with the subject areas. The suggested activities may not require the use of the computer directly, but they can still be related to the software or theme. The WEB on the next page is an example of the adaptability of this software to a theme.

Software WEB


LANGUAGE ARTS
• read a book about people's experiences in new situations (RD)
• write a poem about adjusting to a new situation (W)
• dramatize one of the scenarios in the simulation (RP)
MATHEMATICS
• present a report about the distances measured to school or stores in terms of number of steps from your home (S)
• create a timeline showing population changes in five-year intervals (RP)
PHYSICAL EDUCATION
• design and run a long-distance route through your community (RP)
• invite a local sports or recreation expert to speak to the class (L)
VISUAL ARTS
• create a multimedia display for depicting multi-ethnic backgrounds (V)
• interview a local artist or craftsperson (S/L)
NEW KID IN TOWN
(adjusting to new situations)
HEALTH
• submit an article on a local health clinic to the school newspaper (W)
• compile a class booklet of family recipes in food group categories (RP)
MUSIC
• perform with instruments made from materials gathered in the community (RP)
• listen to musical selections conveying different moods (L)
SOCIAL STUDIES
• research the resettlement of refugees in your community (RP)
• make a community map (RP)
• conduct a survey of neighborhood facility use (L)
SCIENCE
• observe and record variations in classmates' hair, skin, and eyes (RP)
• conduct and explain soil tests on neighbors' gardens and then suggest appropriate plants (S)

Pre-computer Activities for *New Kid in Town*

- Students could brainstorm "feeling" words and record them on chart paper, underlining positive feeling words (greenlights) in green, and negative feeling words (redlights) in red.
- Small groups of interested students may wish to match personal experiences with the feeling words listed on their "feelings" chart.
- Pairs of students might select and role play personal "redlight" and "greenlight" experiences for their partners to identify.
- Everyday symbols, such as Walk and Don't Walk signs, activate students' prior knowledge of icons. Invite students to talk about the symbols, why they are used, and to think of other symbols they have seen in their community.
- Some students might like to design symbols, or icons, to represent instructions and then explain their icons to the class.
- To prepare for the electronic journal in the simulation, students could keep a journal of problems they encounter each day, describe what happened, and express how they felt.
- Students may create a bulletin board with the six problem-solving steps and invite other students to write personal examples for each step.
- After listening to a description of an open-ended problem, students could respond in writing and share their solutions.



With permission of the developer, Interactive Image Technologies, Ltd.

At the Computer with *New Kid in Town*

Although ***New Kid in Town***, like other narrative simulations, can be used by individuals, it is best used by pairs or small groups. Initially, students may be reminded to take turns at the keyboard and share other responsibilities so that everyone is actively involved.

Use of ***New Kid in Town*** may be diversified in the following ways:

- Individuals may work on the first two scenarios and then share with the class their decisions and experiences.
- Pairs or small groups, grouped on the basis of complementary abilities or experiences, could tape record their work at the computer for analysis later.
- The class may view the first scenario, using a large screen monitor, and then discuss their decisions before continuing independently.
- Students may collect, collate, and bind journal entry printouts. This could serve as a motivational tool for personal writing while interacting with the simulation.

Students working in pairs and small groups provide an excellent opportunity for you to observe behavior and evaluate reading, communication, and problem-solving skills. Sample checklists are provided on pages 24-26.

Post-computer Activities with *New Kid in Town*

New Kid in Town provides many opportunities for curriculum integration. Since the simulation is based on real life, themes of particular interest to the class may be developed. The act of reading links the fictional world of the simulation to the real world. Students may choose one or more of the responding activities which have been coded by the subject areas of health (**H**), language arts (**LA**), mathematics (**MA**), music (**MU**), physical education (**PE**), science (**SC**), social studies (**SS**), and visual arts (**VA**).

RECEPTIVE MODE

Reading: Enjoying Personal Reading (LA)
Students read books related to the theme of adapting to new situations. A suitable Primary Level title is *Moving Gives Me a Stomachache* by Heather McKend. Some Junior Level titles are *Left Behind in Squabble Bay* by Jack Hodgins, *Felita* by Nicholasa Mohr, *Ganesh* by Malcolm J. Bosse, *Anastasia Again* by Lois Lowry, *Don't Ask Miranda* by Lila Perl, and *One of Us* by Nikki Amdur.

Viewing: Viewing a Film/Video on Adaptations (SC)
Students may view a film or video of organisms in their natural habitats, observing particular physical characteristics which help the organisms survive.

Listening: Creating a Musical Essay (MU)
Students may combine a variety of mood music on one tape to convey different emotions, moving from conflict to climax to resolution. Their tape could later be used as background for a poetry reading session.

EXPRESSIVE MODE

Writing: Updating Personal Journal (LA)
Students could revisit their personal journals written as one of the pre-computer activities to select one of the early problems they described. They would now record different ways to solve that problem and predict possible consequences. Some may wish to share their journals.

Writing: Documenting Events of a Move (MA)
Students could document a move to a new situation using a timeline. They would order the events during a period of time before and after the move and compare their timelines, noting similarities/differences.

Speaking: Discussing Social Issues (SS)
Some students might like to talk about some of the social issues raised in the simulation, including dealing with bullies and accepting newcomers.

Representing: Creating a Portrait (VA)
Students could experiment with different media, such as paint or pastels, to create a portrait of their visualization of the "new kid."

Viewing: Using a Computer (H)
Students might like to extend their knowledge about the heart and related stress, using a computer program about the heart, such as ***Heart Simulator***.

Representing: Demonstrating a Skill (PE)
A newcomer to the class might volunteer to demonstrate a favorite sport or game. Students could discuss variations and perhaps even try a new version.

10. Classroom Activities

The new learning environment in your classroom may now include hardware and software to some extent. An area may have been set aside for a computer learning centre. Students may be busy at a host of computer-related tasks appropriate to their individual differences, and class schedules and time management may be in place to ensure fair computer access for all students. Computer software may already be integrated into the whole-language curriculum to some degree.

Once everyone is comfortable with these innovations, it may be time to initiate special interest projects. The ones described in this chapter fall within two broad categories. The first, communicating, includes computer-related books, student-processed books, and computer scrapbooks. The second, creating, comprises ideas for special months and days, computer arts and crafts, and computer bulletin boards.

Computer-Related Books

More and more computer-related fiction and non-fiction are being published every year with topics ranging from historical perspectives to science fiction. The same selection criteria applies to computer-related books as to others. These books provide springboards for a multitude of applications: non-fiction titles, useful as resources in library or computer centres, also lend themselves to creative activities; fiction titles provide glimpses beyond real life and many contain unusual settings, characters, and plots which can heighten their readers' computer awareness. In particular, the attributes of fictional robots may be assessed and compared to those now in operation.

Computer-related books have an important place in your integrated whole-language curriculum. A collection of books on computer topics can be placed in the reading or computer centre. In addition, a variety of reading-related activities can be applied: reading a book as an introductory or concluding activity for a theme, listening to one during a theme, or focusing on one for a novel study.

Extending computer-related books:

- Invite an author or illustrator to visit the class or school.
- Encourage students to write reviews for the school's computer newspaper.
- Send a list of suggested books home for holiday reading.
- Help the librarian set up a special computers/technology display.

Student-Processed Books

When students produce their own books, they use many creative skills to convey their experiences and enthusiasm to others. As multilevel tasks, such projects take into account individual differences in learning style, age, and ability. At the same time they stimulate interest in reading and writing. Since students enjoy following a process to completion, their self-published books are usually a great source of pride and a boost to self-esteem.

A variety of software is available for helping students write and illustrate their own books. In addition to the generic word processing and graphics programs, ones such as ***Build a Book About You*** and ***Author, Author*** are designed specifically for producing books.

Although the initial production stage may be computer-based, subsequent ones are common to all student book production. Students may dictate their stories or poems for someone else to enter, write them on paper first to enter later, or compose at the computer. Some basic editing can be done on the computer with programs that have spelling checkers. The kind of paper-and-pencil editing done for any writing assignment also applies to computer editing, which can be done directly on screen or on the printout. Whatever method is selected, it must suit the ability and skills of the writer. The editing should make sufficient corrections to ensure effective communication with the readership without discouraging the author.

Students can use the computer to write and/or illustrate books in a variety of modes and styles:

- personal stories and journals
- poetry and songs
- big books and mini-books
- pop-up and fold-out books
- recipe books and how-to books
- personal dictionaries.

Once the printouts have been obtained, photocopies can be made so that authors can keep their originals, which they usually wish to do. Authors may include a title page, a brief autobiography, and a sheet at the end for readers' comments. Wrap-around covers may be made from bristol board, heavy kraft paper, or even wallpaper remnants. Cover designs, laminated for extra protection, may be computer graphics, personal artwork, a photo collage, cloth, or cutouts of colored paper or wallpaper. Various binding procedures can be employed, from sewing to stapling to taping. With the assistance of parent volunteers or library resource staff, a more professional look may be obtained with a plastic binding.

Some schools actually have a "publishing house," usually organized by library resource centre personnel and frequently staffed by parent volunteers or senior students. They assist with the selection of materials, the editing process, and the printing and binding. Library pockets and cards may be attached to the back covers to facilitate circulation.

Books published in this manner have a wide audience because the finished products are attractive and appealing. Students are invariably eager to share them with classmates, friends, and relatives, display them in computer centres, lend them to other classes, or even donate them to the school libary. Book exchanges are sometimes arranged among schools producing such books. Thus, with the use of the computer, a new dimension can be added to students' publishing endeavors.

Computer Scrapbooks

Scrapbooks are an excellent medium to stimulate and sustain interest in a topic or theme. Business publications, magazines, newspapers, and advertisements provide articles and pictures for individual collections. Students can use these to create personal bodies of knowledge. In doing so, they read, sort, and categorize, and may even respond by writing and speaking about items included in their scrapbooks.

The skills students develop in scrapbook activity can be put to practical use. Working individually, in small groups, or with the entire class, they can determine how to organize their computer-related materials, which may include some of the following:

- cartoons and jokes
- manufacturers' promotional materials
- computerized forms, cheques, and bills
- survey and interview sheets
- examples of clip art
- articles and reviews
- photographs.

These items, along with labels or brief descriptions, may be grouped chronologically or by topic. Scrapbooks can be shared while they are being compiled or upon completion. If students work on them as a computer-centre activity, they will have opportunities to use graphics / text software to design the covers. Finished scrapbooks may be placed in other learning centres as a resource or taken home for friends and families to enjoy.

Special Months and Days

The school year is full of birthdays, holidays, and special events that provide great ideas for themes and activities which are easily integrated into all subject areas. Students enjoy participating in projects that relate to the seasons or to the culture of their families. Drawing upon a wide range of both creative and thinking skills, they develop awareness and master applications by using computers.

Students enjoy creating personal calendars, using programs such as ***My Very Own Calendar*** and ***Create a Calendar.*** This generic software is so adaptable that it can be used with most students at the elementary level. Some graphics / text software, such as ***The Print Shop Graphics Library Holiday Edition®*** and ***SuperPrint Holiday Graphics Pack***, are collections of extra graphics on separate disks that can be used along with the main software. Others, like ***Seasons and Holidays*** and ***Seasons and Special Days***, contain a variety of clip art and operate on their own.

During the school year, each season brings special days. The following software relates directly to some of the many special days or times:

Fall	Hallowe'en	***Mask Parade***
Winter	Christmas/Hanukkah	***Bake and Taste***
Spring	St. Patrick's Day	***Lucky's Magic Hat***
Summer	School Vacation	***Postcards***

Hallowe'en is a great time for imaginative dressing up. ***Mask Parade*** can be a catalyst for both visual arts and language arts activities. It will help students make their own masks, accessories, and jewelry to go with Hallowe'en costumes. Students can color and cut out the printout designs to go with costumes they bring from home. They may even wish to stage a narrated fashion show in which individuals have an opportunity to model and describe their outfits.

During festive seasons, special foods or baked goods become an important aspect in many cultures. ***Bake and Taste*** can link classwork done on measurement to real-life baking. Colorful, animated graphics provide recipes, list ingredients, and illustrate measuring with kitchen utensils. Students can obtain printed recipes for desserts they have "baked" on the computer. The class may actually bake traditional cookies or one of the desserts in the program.

St. Patrick's Day is a time for "little people," limericks, and shamrocks. ***Lucky's Magic Hat***, featuring a leprechaun, of

course, contains word games. Students might like to research Irish customs or make up their own word games complete with "pots of gold" as rewards.

During long school holidays, students often miss their classmates and friends. ***Postcards*** provides them with a way to keep in touch. Students could make, stamp, and address postcards before school ends. They could then write messages and mail them in the summer whenever they wish to share some news.

Computer Arts and Crafts

Computers can both provide the subject matter for arts and crafts projects and be the tools that create them. Students enjoy collecting and exploring materials. When integrated into themes and subject areas, arts and crafts become concrete representations of students' skills, knowledge, and values. Arts and crafts activities can be included in most learning centres or presented in their own context.

Regular art supplies and scrap materials, including discarded computer components, can be used to make works of art. With robots as the subject matter, students can construct models from boxes, foil, wire, and buttons. The issue of computers in society could be the topic of a collage assembled with silicon chips, disks, photographs, and printouts. These activities encourage students to express their impressions of technology.

Using the computer as a tool or medium to express these impressions, students can apply a wide range of software, such as the programs mentioned in the section on special months, days, and holidays. Their printouts may be considered works of art, because their choices of clip art and the design quality of the pictures make them original. Printouts can also be used creatively. Computer-designed masks, for example, can be colored and decorated for dramatic play.

Dazzle Draw, ***Delta Drawing***, ***MacPaint***, and other drawing programs encourage the creation of original art on the computer screen. Some of these programs require special input devices, such as a mouse or drawing pad. The printouts can be colored, mounted, and framed for display. Whether the computer is used as a tool or as a subject, the same standards apply to the

creative process and to the finished products as to other creative media. Computers are simply another medium for artistic expression.

Computer Bulletin Boards

Displaying students' work is a good way to acknowledge their efforts and instill pride in their work. Bulletin boards, which serve as the display area for work completed in various learning activities, can also function as teaching tools and sources of entertainment. Representing skills can be tapped when students help to set up bulletin boards. Visual displays can be enjoyed by the whole school as well as the class. Many computer-related projects, such as the ones described in the arts and crafts section, can be incorporated into bulletin boards. Graphics software can also be used to create titles, labels, captions, and border designs.

Design a holiday theme bulletin board — Primary Level:

- Cover a bulletin board with sheets of decorative paper, colored construction paper, or wallpaper.
- Cut a large coniferous tree from green paper and centre it on the bulletin board.
- Attach colored decorations made from computer graphics.
- Create a chain from perforated computer paper strips and crisscross the tree with it.
- Surround the tree with students' seasonal artwork.
- Label the whole display with a computer-produced banner reading "Holiday Greetings."

Design a "Book Fest" theme bulletin board — Junior Level:

- Cover a bulletin board with newspaper and magazine book review sections.
- Using a graphics / text program, design new covers for favorite books.
- Using a word processing program, compose brief summaries of the plots.
- Illustrate meaningful scenes from the stories, using pastels, watercolors, or charcoal.
- Mount each book cover and illustration on colored construction paper.
- Attach book covers to reveal matching summaries.
- Scatter the illustrations among the book covers.
- Label with a computer-produced banner reading "Peek at Our Favorites."

Design an environmental theme bulletin board — Intermediate Level:

- Cover a bulletin board with sheets of newspaper.
- Using a drawing program, create and make mulitiple copies of a garbage can.
- Using a word processing program, enter recycling questions and answers.
- Cut out and paste the questions on to the garbage cans.
- Attach the garbage cans to the bulletin board so they can be flipped up and paste on the answers.
- Decorate the board with plastic bags, paper rolls, tin cans, or plastic bottles.
- Label with a computer-produced banner reading "Recycle for Our Future."

11. Beyond the Classroom

Your computer-integrated classroom may now be a hive of whole-language activity punctuated by spurts of energy to generate extra projects. Students may have read computer-related fiction and non-fiction. Published books by budding authors, poets, and illustrators may have found their way to the computer, reading, and library centres. Some students may have compiled computer scrapbooks.

As the school year advanced, the class may have enjoyed software-inspired activities based on seasons or special days. Arts and crafts made with the assistance of, or about, computers may be proudly displayed throughout the classroom. Attractive bulletin boards may boast students' computer expertise. All of these extra projects may have contributed something special to the overall computer integration.

Although seemingly unlimited classroom activities develop in a computer-integrated, whole-language program, there comes a time when you and your students look to broader horizons. Reaching out to the school and to the community is the thrust of this chapter. With increasing expertise and confidence, you may now be comfortable enough to work with other staff members and students on even larger projects than those already described.

Perhaps starting a school computer newspaper or planning computer-related field trips may be the next activity to consider. If enough students indicate sustained interest in the technology, starting a computer club may be the penultimate challenge. And finally, a school very much involved in computer education may inspire you, along with your colleagues, to synthesize a multitude of activities in the form of a computer fair!

This chapter deals with these "beyond-the-classroom" projects, explaining why they are valuable and outlining methods for putting them into effect. The tips and suggestions are intended to supplement the whole-language activities of the computer-integrated classroom.

Computer Newspapers

Along with response journals and self-published books, newspapers and newsletters provide vehicles for students' writing and drawing. Like regular school or classroom newspapers, computer newspapers may be varied in format and content — containing articles, puzzles, and illustrations. Their focus, however, is on the use of computer technology in school and society.

Working on computer newspapers and reading the final products are rich educational experiences. Whether students use word processing, graphics/text, or specially designed newspaper programs, they will have opportunities to explore a variety of computer applications. As they work together to produce such newspapers, students become active participants, utilizing such skills as reading, writing, editing, evaluating, and organizing — plus the invaluable experience of working together. Computer connections can be made in a wide range of subjects. An article about computers used in hospitals, for example, might also touch upon science and health.

Computer newspapers are important communication links with parents, the general public, and even community businesses. From them readers can gain fresh perspectives on computers and what is happening in their schools and communities. Students will benefit from following the newspaper production process, from inception to distribution, and will gain wide recognition for their accomplishments.

The computer newspaper may be published on a regular schedule, monthly, or in response to the needs and interests of the class. For each issue, a committee or editor should set the goals, consider the audience, and determine the content. The editorial staff can also make decisions on the format, which may include feature articles, regular columns, and guest contributions.

Articles for the computer newspaper may cover a wide range of topics, such as:

- profiles of computer users
- software and book reviews
- services, clubs, and courses available
- upcoming events
- editorials and letters-to-the-editor

- mini-lessons on computer use
- "tips and chips" on computers.

On a lighter note, the newspaper can also include fun items to involve readers:

- word puzzles and wordsearches (computer-generated)
- jokes and riddles
- mazes and games.

Illustrations can add visual interest:

- clip art and graphics (computer-generated)
- drawings (computer-generated)
- original artwork
- photographs and stickers
- cartoons.

Once decisions have been made concerning the articles, fun items, and illustrations, the projects are assigned to reporters, who research and produce them. If word processing and graphics/text software are used, the printouts have to be cut and pasted into the newspaper format. **Newsroom**, **ReadySetGo**, and **Micro News** incorporate features to assist in the design and layout. The final printouts can serve as masters for duplication. Once the newspaper has been printed and assembled, the distribution crew can go into action. Newspapers can be delivered to classroom computer centres, other classes, school libraries, and prearranged community locations. They can also be used for fund-raising or as a simulated business venture. The proceeds from newspaper sales and advertising fees may then be used to purchase new software.

Computer-Oriented Field Trips

As in other school field trips, planning, permissions, transportation, correspondence, and behavior expectations have to be considered when computer-related field trips are arranged. The technological facets of industry, business, and recreation offer a diversity of computer connections between the school and the community. Direct links with technology would involve visits to firms or businesses involved in the production of hardware

and software. Indirect connections would involve examining computer applications in companies and institutions.

The purpose of field trips is to develop computer awareness. Students may want to find out about the hardware and software itself. This can include the manufacturers, the product-lines, and marketing. They may delve into other areas, such as skills and training of workers, the effect on people, and costs/benefits to society. Another direction for students to investigate can be actual uses of hardware and software. For this purpose, they may wish to visit offices and stores to research occupations and interview professionals to find out how computers are being used. Investigations such as these help students relate their computer experience to broader technological perspectives.

Students will benefit from preparatory and follow-up activities. Field trips and the tasks involving them can be thoroughly integrated into the classroom curriculum, provided that a clearly stated purpose is established and understood prior to the visit.

In addition to the usual field trip sites of stores and banks, many locations with direct and indirect computer connections are possible.

Direct computer connections:

- hardware manufacturers — computer components
- software development firms — professional teams
- sales outlets — diversity of equipment
- trade shows — new products.

Indirect computer connections:

- car dealers — computerized inventory of vehicles and parts
- hospitals — computerized monitoring devices
- telephone companies — computerized message and accounting
- travel agencies — computerized bookings.

School Computer Clubs

Computer clubs can provide environments in which students explore computers in social settings, bringing with them knowledge, interests, and enthusiasm. Equipment and materials necessary for club activities are available in most schools. Computer

clubs can help students deal with our increasingly information-based society. They can also promote participation, cooperation, and self-motivation among club members in an educational milieu. Computer literacy can be promoted and software mastered.

When students meet in computer clubs, they share common goals and learn together. Members can call upon many skills in ways that allow for individual differences. Outside the classroom, some may benefit from additional practice while others may pursue enrichment projects during club time. The club can be an outlet for students desiring to excel, regardless of dissimilar abilities and needs.

Well-organized computer clubs can be sources of accomplishment and satisfaction for all involved. The club advisor may want to elicit staff support and check available resources, such as *The Apple® Computer Clubs International Handbook*, listed in the bibliography. Teachers with little or no computer experience can be encouraged to help by supervising students and introducing software. This is especially true when club members are from primary grades since they benefit from free play and incidental learning. Older students may be challenged by formal instruction from club advisors. But in cooperative club activities, no one has to be an expert in everything.

Once assistance has been assured and background information obtained, the staff advisor would share the plans and garner administrative and parental support. The next step would be to assess school facilities, remaining flexible enough to adapt club activities to variable numbers of computers and kinds of settings. Computers accessible to the club may be in a lab, gathered from several areas into one classroom, or be in adjacent rooms. At times, additional equipment may be borrowed from other schools or from the board's central resources.

Taking the facilities into account, the advisor would determine the club's size and the selection of members. A quota system may be necessary to ensure fair representation of girls, boys, and grade levels so that there is maximum participation throughout the school year. At the first meeting the goals and guidelines would be discussed and established. Posters and school newspapers would be useful in publicizing and promoting club meetings, activities, and events.

Projects for computer clubs might include:

- mastering particular programs — databases or word processing
- providing promotional materials and services
- publishing club newsletters
- sponsoring computer events
- conducting community outreach projects
- inviting speakers to the school
- organizing computer-related field trips.

Computer Fairs

Depending on the time of year, school computer fairs have different purposes. In the fall, such fairs act as motivational tools to provide impetus for computer learning. In the spring, fairs serve as culminating occasions. The duration of a fair can be a half day, an evening, or a full day. Some schools even mount month-long computer festivals, focusing on applications, entertainment, or future technology.

Regardless of the format, the school computer fair can build upon and reinforce students' interests and increase computer awareness and competency. It can capitalize on expertise as well as utilize equipment, materials, and facilities within the school. Also, at hand, of course, is a ready-made audience in your students, their parents, and interested members of the community.

The learning opportunities involved in computer fairs are purposeful and goal-oriented. Students can use skills in areas including organization, collaboration, and communication. They can choose projects which allow for individual differences, thus permitting them to excel in their strong areas. Participation in computer fairs gives students experience in large-scale projects which reach a wider audience than is usually encountered in the classroom. The boost in self-esteem from their contributing to the larger school event makes all the time and effort worthwhile.

The same organizational planning goes into computer fairs as into any other school-wide event. A committee would decide the direction, date, and duration of the fair. Responsibilities would be defined and allocated. Once the audience has been determined, organizers would establish a budget, promote the fair, and solicit sponsors and donations. Parent groups may be asked to supply and help with refreshments. An outside speaker may be invited to provide the focus, and workshop leaders or other participants contacted.

Students should be encouraged to plan and organize their own booths. The purpose of these displays would be to:

- demonstrate different software
- compare computer systems
- display computer-related arts and crafts
- demonstrate computer newspaper or book production
- present computer club activities
- exhibit individual computer projects
- produce computer-related plays or stories
- teach computer mini-lessons.

Indices

Glossary

The definitions in this selected glossary reflect the meanings that are used in the book. Additional computer terms may be found in two useful references: *The Primary Computer Dictionary*, which has terms of a basic and general nature, and the *The Junior Computer Dictionary*, which has a more technical focus. These and other relevant books are described in the bibliography.

commercial software: programs available from developers or distributors. They are copyrighted like books and may not be copied. Commercial software packages include disks, documentation, and information on obtaining a back-up, or extra, disk.

computer awareness: being conscious of computer technology. It implies knowledge and vision of potential computer use.

computer integration: an approach to teaching in which computer-related activities are part of the curriculum.

cooperative learning: a variety of small-group instructional techniques focusing on peer collaboration.

database: a collection of relevant facts and information. Databases can also be part of a program or exist as separate, self-contained software into which facts and information are added.

documentation: written instructions that explain how to use a computer or its software. Computer documentation is a user's manual which describes the system, its parts, and its use. Software documentation includes the program's name, purpose, and use.

expressive mode: the way in which learning takes place through speaking, writing, and representing; includes such forms as poetry, drawing, and drama. It is fundamental to whole language.

generic software: programs that have a range of uses across grade levels and subject areas.

graphics/text software: generic software that produces pictures and words that can be printed in a variety of finished items, such as posters and banners.

hardware: the computer and equipment used with it, such as a disk drive, a printer, and a modem.

icon: a simplified picture that represents an idea, object, or process. Icons are displayed on computer screens to help users operate programs easily by choosing the desired symbol.

interactive fiction: a genre of computer-assisted literature. Readers enter the fictional world as participants and control the direction and action of the story.

integration: an approach to teaching in which many aspects of learning, such as reading, writing, speaking, listening, viewing, and representing, are related and brought together to make a whole program.

learning centre: an area in the classroom where the focus is on a specific learning opportunity, such as reading, writing, or computer operation.

literacy: the ability to read, write, and process information from different sources, including electronic and microelectronic technology.

matrix: a planning tool which shows the coordination between two sets of information. Matrices help to locate and identify overlapping relationships.

menu: a list of choices displayed on a computer screen. The computer program presents several options from which choices can be made.

narrative simulation: generic software that presents scenarios embedded in a story context. Narrative simulations require reading and decision-making and engage students in a novel-like setting with characters and plot.

peripheral: a piece of equipment connected to a computer. Peripherals are useful but not essential to the overall operation of a computer. Disk drives and printers are peripherals.

physical simulation: generic software that models real-world processes. Physical simulations engage students in experiences which are otherwise difficult, expensive, or dangerous to explore.

printout: the output of the computer which is printed on paper. To obtain printouts, commands instruct the computer to transfer information to the printer. Printouts are also known as hard copies.

public domain software: not owned by any company or individual. This kind of software is available for the public to use and to copy. Usually, the only cost is the price of the disk or a small fee for copying.

receptive mode: the way in which learning takes place through listening, reading, and viewing. It is fundamental to whole language.

sex equity: fair and just treatment accorded to every individual, regardless of sex. It means equal computer access and instruction for both females and males.

simulation: generic software designed to imitate real-life situations and environments. Simulations emphasize problem-solving through manipulation of variables and modification of scenarios.

software: any program that a computer uses to do its work. Software programs are stored on hard or floppy disks.

WEB: a planning tool that shows relationships of parts to a whole. A WEB helps to organize visually different topics, ideas, or activities.

whole language: a child-centred approach to developing literacy. Holistic reading and writing experiences are built upon children's existing knowledge of oral and written language. It is consistent with the sequence of children's learning: comprehension, speech, writing, reading, and thinking. Both receptive and expressive modes of learning are fundamental to whole language.

word processing: generic software for typing and editing. The operator can move words and sentences without having to retype the entire text. Edited text is stored in the computer's memory and may be printed.

Software

The following list contains selected software described in this book. The software is listed alphabetically by title, along with the name of the publisher and the pages on which the software is mentioned or described. Comparable software may be substituted for the ones listed.

Board or school's resources help teachers keep abreast of the latest developments in software. Magazines, journals, and up-to-date catalogues of current software are available to all teachers through their board or school computer consultants. With computers continually being upgraded with larger and more powerful memories and increasing capabilities, programs that take advantage of these features are certain to be developed. In the case of simulations, more powerful computers are essential. Their larger memories can handle more extensive databases, provide more complex options, and call upon a greater variety of thinking skills.

Appleworks 72	Claris
Author, Author 88	Mindplay
Bake and Taste 91	Mindplay
Bank Street Writer 72	Broderbund
Body Transparent 42	Designware
Build a Book About You 88	Mindscape
Create a Calendar 91	EPYX
Crossword Magic 44	Mindscape
Dazzle Draw 42, 72, 92	Broderbund
Delta Drawing 92	Spinnaker Software
First Letters and Words 50	First Byte
First Shapes 50	First Byte
Heart Simulator 86	Focus Media
Kid Pro Quo 72	Softsync
Kidwriter 72-78	Spinnaker Software
Learn About: Animals 50	Sunburst
Lucky's Magic Hat 91	Advanced Ideas
MacPaint 92	Silicon Beach Software
Magic Cash Register 42	Metacomet
Mask Parade 91	Springboard Software
Micro News 42, 97	Logicus

Music Studio 42	Activision
My Very Own Calendar 91	Mindscape
New Kid in Town 80-86	Interactive Image Technologies, Ltd.
Newsroom 97	Springboard Software
Odell Lake 42	MECC
Paperclip III 72	Batteries Included
Postcards 92	Activision
Print Magic 63	EPYX
ReadySetGo 97	Manhattan Graphics
Seasons and Holidays 91	Electronics Arts
Seasons and Special Days 91	Sunburst
Snooper Troops 80	Spinnaker
Snoopy Writer 72	Random House
Stickybear Music 50	Weekly Reader Software
Stickybear Printer 50, 63	Weekly Reader Software
Stickybear Spellgrabber 50	Weekly Reader Software
Stickybear Town Builder 50	Weekly Reader Software
Stickybear Word Problems 50	Weekly Reader Software
Storytree 72	Scholastic Software
SuperPrint Holiday Graphics Pack 63, 91	Scholastic Software
Swiss Family Robinson 80	Windham Classics
Teddy Bear-rels of Fun 50, 51	DLM
Teddy's Playground 50	Sunburst
The Print Shop® 63-69	Broderbund
The Print Shop Graphics Library Holiday Edition® 91	Broderbund
The Print Shop Companion® 64	Broderbund
The Three Bears 50	Millennium Group Inc.
Unlocking the Map Code 42	Rand McNally
Where in the World Is Carmen San Diego? 80	Broderbund
Winnie the Pooh in the Hundred-Acre Wood 50, 52	Sierra
Wizard of Oz 80	Windham Classics
Wordsearch 44	Hartley
Wordsearch and Crossword Puzzles 42	in the public domain

Software Publishers

Software mentioned in this book is available through the following publishers. If you cannot locate a particular piece of software, consider contacting a local software distributor.

Advanced Ideas Inc.
2902 San Pablo Ave.
Berkeley, CA 94702
(415) 526-9100

Batteries Included (*see* Electronic Arts)

Broderbund
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170

Designware Inc.
185 Berry Street
San Francisco, CA 94107
(415) 546-1866

DLM Inc.
One DLM Park
Allen, TX 75002
(214) 248-6300

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171

First Byte Software
181 Richmond Street West
Toronto, ON
M5V 1V3
(416) 591-9301

Focus Media Inc.
839 Stewart Ave.
Garden City, NY 11530
(516) 794-8900

Hartley Courseware
133 Bridge Street
Box 419
Dimondale, MI 48821
(517) 646-6458

Interactive Image Technologies, Ltd.
49 Bathurst St.
Suite 401
Toronto, ON
M5V 2P2
(416) 361-0333

Logicus Inc.
P.O. Box 277
Nobelton, ON
L0G 1N0
(416) 859-4287

MECC Software
3490 Lexington Ave. N.
St. Paul, MN 55126
(612) 481-3500

Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
(312) 480-7667

Rand McNally
8255 North Central Park Ave.
Chicago, IL 60680
(312) 673-9100

Random House Software
400 Hahn Road
Westminster, MD 21157
(800) 638-6460

Scholastic-TAB Publications Ltd.
123 Newkirk Road
Richmond Hill, ON
L4C 3G5
(800) 268-3848

Sierra On-Line
P.O. Box 485
Coarsegold, CA 93614
(209) 683-6858

Silicon Beach Software
P.O. Box 261430
San Diego, CA 92126
(619) 695-6956

Spinnaker Software Corp.
1 Kendall Square
Cambridge, MA 02139
(617) 494-1200

Springboard Software, Inc.
7808 Creekridge Circle
Minneapolis, MN 02139
(612) 944-3915

Sunburst Communications
P.O. Box 3240,
Station F
Scarborough, ON
M1W 9Z9
(800) 247-6756

Weekly Reader Family Software
4343 Equity Drive
P.O. Box 16754
Columbus, OH 43216

Windham Classics (*see* Spinnaker Software Corp.)

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American Institute for Research in the Behavioral Sciences. ***Ideas for Equitable Computer Learning***. Palo Alto, California, 1983. This publication helps classroom teachers improve students' computer learning opportunities. Barriers to equity and strategies to overcome them are discussed. Includes a student computer survey and an educator's self-assessment checklist.

Davidson, Jane Ilene. ***Children and Computers Together in the Early Education Classroom***. Albany, New York: Delmar Publishers, Inc., 1989. In a general, clear overview, this book covers ways to begin using computers, computer skill activities, and also touches upon computer awareness issues. Some software-specific activities are presented.

The Dellcrest Children's Centre and Interactive Image Technologies, Ltd. ***Redlights, Greenlights.*** Toronto, Ontario, 1988. An effective problem-solving package that provides flexible tools to help students become better problem-solvers. Twenty-two lesson plans and a computer program, *New Kid in Town*, for teaching problem-solving in the classroom. Includes teaching suggestions, six problem-solving steps, and support materials.

Girard, Suzanne and Kathlene R. Willing. ***The Primary Computer Dictionary***. Cobalt, Ontario: Highway Book Shop, 1983. Fifty entries, including general concepts, hardware, and keys, are defined in large clear text. Diagrams, an animated computer character, and practice keyboards contribute to a format suitable for students at the primary level.

Goodman, Kenneth, Goodman, Yetta, and Hood, Wendy (editors). ***The Whole Language Evaluation Book***. Portsmouth, New Hampshire: Heinemann Educational Books, Inc., 1989. An anthology of insightful essays on whole language by teachers involved in the process. The collection includes theory and general principles, and a glimpse into the process of becoming a whole-language teacher. The authors explain how they evaluate their teaching.

Goodman, Kenneth. ***What's Whole in Whole Language?*** Richmond Hill, Ontario: Scholastic-TAB Publications Ltd., 1986. This concise introduction to the main aspects of whole language includes the rationale, the role of children, educators, and schools, as well as practical teaching suggestions.

Hunter, Beverly. ***My Students Use Computers: Computer Literacy in the K-8 Curriculum***. Reston, Virginia: Reston Publishing Company, Inc., 1984. Presents a well-organized curiculum comprising six "strands" which include using programs, fundamentals, and applications. Chapters 4 through 7 include sample activities for subject areas using a wide range of software presented in thorough lesson plans.

Marvelle, John D., and MacLean, Christine Kole. ***The Apple Computer Clubs International Handbook***. Cupertino, California: Apple Computer, Inc., 1985. A practical, comprehensive guide to establishing and maintaining all aspects of computer clubs. Includes special award program areas, a software catalogue, and organizational checklists.

Parsons, Les. ***Response Journals***. Markham, Ontario: Pembroke Publishers Ltd., 1990. A handbook for implementing a whole-language program based on personal response. Chapters on responding to journals, developing small-group discussions, and evaluating response journals could be applied to computer-integrated activities.

Sanders, Jo Shuchat, and Stone, Antonia. ***The Neuter Computer: Computers for Girls and Boys***. New York: Neal-Schuman Publishers, Inc., 1986. Founded on a well-researched and documented community/school project, this book shows how to increase or improve children's computer use. Part One includes uses of graphics, word processing, and other technical applications. Parts Two and Three detail the rationale, strategy, and implementation of the equity program.

Smith, Frank. ***Insult to Intelligence***. New York: Arbor House, 1986. For those concerned with the direction education should take, this book is loaded with political ammunition. Of special interest is the chapter on computers. An analysis of computer use offers some ideas for a promising future.

Willing, Kathlene R., and Girard, Suzanne. ***The Junior Computer Dictionary***. Cobalt, Ontario: Highway Book Shop, 1984. One hundred and one entries, including general concepts, inner workings, computer language, and communications, are technically, yet simply, defined. Numerous diagrams and an animated computer character extend the meanings at the junior and intermediate levels.

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Kathlene R. Willing and **Suzanne Girard** have been involved with students, classrooms and computers for many years. They have shared their enthusiasm for computers and learning through five popular books, numerous workshops and professional articles.

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